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46.

589.

A
PRACTICAL AND COMPREHENSIVE
ARITHMETIC;

CONSTRUCTED

ON AN IMPROVED PLAN TO ALLEVIATE THE
LABOURS OF THE MASTER IN THE PRIMARY RULES;

CALCULATED

TO ENLARGE THE MINDS OF PUPILS AND EXCITE A TASTE
FOR THE VARIOUS BRANCHES OF MATHEMATICAL SCIENCE;

INTENDED

TO FURNISH A COMPLETE AND EXTENSIVE SYSTEM OF
ARITHMETIC FOR THE SCHOLAR AND ARTIFICER; AND

ADAPTED TO THE PRESENT TIME.

BY J. ATKIN,

Author of the Practical & Self-Instructing English Grammar;
and Master of the Grammar School, Goole.

> "Omnibus in terris pauci dignoscere possunt
> Vera bona, atque illis multum diversa, remota
> Erroris nebula."—*Juv.*

Εἰς τα μαϑηματικα κλεὶς εςτι αριϑμετικῃ.

"Logarithms in calculation are like the steam-engine in mechanics."—*The Penny Magazine.*

LONDON:
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1846.

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TO

THE TRUSTEES

OF THE

GOOLE GRAMMAR SCHOOL,

THE ENSUING

TREATISE ON ARITHMETIC

IS INSCRIBED

WITH THE MOST PROFOUND RESPECT, AND WITH EVERY

FEELING OF GRATITUDE,

BY THEIR MOST HUMBLE,

MOST DEVOTED,

AND MOST OBEDIENT SCHOOLMASTER,

JOHN ATKIN.

School-House, Old Goole,
1846.

PREFACE.

Arithmetic being a science on which other sciences absolutely pend, we need not be surprised that so many Treatises on this sul are ushered into the scholastic world; the Author's motives in senting this New Treatise to the public are the following:—

To supply the acknowledged inadequacy of extant treatises (moderate price,) to imprint a thorough knowledge of the elemen rules on the nascent mind.

To mitigate the laborious task, the mental perplexity, and the calculable loss of time which every sedulous school-master ex ences in teaching the initiatory rules.

To present to school-masters, parents, and the public at lar concise, comprehensive, accurate, and instructive Treatise on A metic, free from technical inelegance, jejune insipidity, and invo intricacy, which defeat the efforts of the youthful inquirer.

The fundamental information in the various departments of L rithms, Geography, Chronology, Algebra, Practical Mensuration Mental Calculation is such as to bring into action the stud thinking powers, and improve his mental faculties, as well as pre him for his future avocations in life.

The sums in Simple and Compound Addition are so clearl pressed and so judiciously arranged, that the master can exa them without loss of time.

The author's principal aim through the whole work has bee make the rules perspicuous, the exercises numerous, the arrange scientific, the matter interesting, the language intelligible, the jects valuable, and the price so remarkably cheap as to place it w the reach of all classes of the community, how far he has succe is left for a discerning public to determine.

ADDITION TABLE.

2 and 1 are 3
2... 2... 4
2... 3... 5
2... 4... 6
2... 5... 7
2... 6... 8
2... 7... 9
2... 8...10
2... 9...11
2...10...12
2...11...13
2...12...14
3 and 1 are 4
3... 2... 5
3... 3... 6
3... 4... 7
3... 5... 8
3... 6... 9
3... 7...10
3... 8...11
3... 9...12
3...10...13
3...11...14
3...12...15
4 and 1 are 5
4... 2... 6
4... 3... 7
4... 4... 8
4... 5... 9
4... 6...10
4... 7...11
4... 8...12
4... 9...13
4...10...14
4...11...15
4...12...16
5 and 1 are 6
5... 2... 7
5... 3... 8
5... 4... 9
5... 5...10
5... 6...11
5... 7...12
5... 8...13
5... 9...14
5...10...15
5...11...16
5...12...17
6 and 1 are 7
6... 2... 8
6... 3... 9
6... 4...10
6... 5...11
6... 6...12
6... 7...13
6... 8...14
6... 9...15
6...10...16
6...11...17
6...12...18
7 and 1 are 8
7... 2... 9
7... 3...10
7... 4...11
7... 5...12
7... 6...13
7... 7...14
7... 8...15
7... 9...16
7...10...17
7...11...18
7...12...19
8 and 1 are 9
8... 2...10
8... 3...11
8... 4...12
8... 5...13
8... 6...14
8... 7...15
8... 8...16
8... 9...17
8...10...18
8...11...19
8...12...20
9 and 1 are 10
9... 2...11
9... 3...12
9... 4...13
9... 5...14
9... 6...15
9... 7...16
9... 8...17
9... 9...18
9...10...19
9...11...20
9...12...21
10 and 1 are 11
10... 2...12
10... 3...13
10... 4...14
10... 5...15
10... 6...16
10... 7...17
10... 8...18
10... 9...19
10...10...20
10...11...21
10...12...22
11 and 1 are 12
11... 2...13
11... 3...14
11... 4...15
11... 5...16
11... 6...17
11... 7...18
11... 8...19
11... 9...20
11...10...21
11...11...22
11...12...23
12 and 1 are 13
12... 2...14
12... 3...15
12... 4...16
12... 5...17
12... 6...18
12... 7...19
12... 8...20
12... 9...21
12...10...22
12...11...23
12...12...24

MULTIPLICATION TABLE.

2 times	3 times	4 times	5 times	6 times	7 times	8 times	9 times	10 imes	11 times	12 times
1 are 2	1 are 3	1 are 4	1 are 5	1 are 6	1 are 7	1 are 8	1 are 9	1 are 10	1 are 11	1 are 12
2 ... 4	2 ... 6	2 ... 8	2 ... 10	2 ... 12	2 ... 14	2 ... 16	2 ... 18	2 .. 20	2 .. 22	2 ... 24
3 ... 6	3 ... 9	3 ... 12	3 ... 15	3 ... 18	3 ... 21	3 ... 24	3 ... 27	3 ... 30	3 ... 33	3 ... 36
4 ... 8	4 ... 12	4 ... 16	4 ... 20	4 ... 24	4 ... 28	4 .. 32	4 ... 36	4 ... 40	4 ... 44	4 ... 48
5 ... 10	5 ... 15	5 ... 20	5 ... 25	5 ... 30	5 ... 35	5 .. 40	5 ... 45	5 ... 50	5 ... 55	5 ... 60
6 ... 12	6 ... 18	6 ... 24	6 ... 30	6 ... 36	6 .. 42	6 ... 48	6 ... 54	6 ... 60	6 ... 66	6 ... 72
7 ... 14	7 ... 21	7 ... 28	7 ... 35	7 ... 42	7 ... 49	7 ... 56	7 ... 63	7 ... 70	7 ... 77	7 ... 84
8 ... 16	8 ... 24	8 ... 32	8 ... 40	8 ... 48	8 ... 56	8 ... 64	8 ... 72	8 ... 80	8 ... 88	8 ... 96
9 ... 18	9 ... 27	9 ... 36	9 ... 45	9 ... 54	9 ... 63	9 ... 72	9 ... 81	9 ... 90	9 ... 99	9 ...108
10 ... 20	10 ... 30	10 ... 40	10 ... 50	10 ... 60	10 ... 70	10 ... 80	10 ... 90	10 ...100	10 ...110	10 ...120
11 ... 22	11 ... 33	11 ... 44	11 ... 55	11 ... 66	11 ... 77	11 ... 88	11 ... 99	11 ...110	11 ...121	11 ...132
12 ... 24	12 ... 36	12 ... 48	12 ... 60	12 ... 72	12 ... 84	12 ... 96	12 ...108	12 ...120	12 ...132	12 ...144
13 ... 26	13 ... 39	13 ... 52	13 ... 65	13 ... 78	13 ... 91	13 ...104	13 ...117	13 ...130	13 ...143	13 .. 156
14 ... 28	14 ... 42	14 ... 56	14 ... 70	14 ... 84	14 ... 98	14 ...112	14 ...126	14 ...140	14 ...154	14 ...168
15 ... 30	15 ... 45	15 ... 60	15 ... 75	15 ... 90	15 ...105	15 ...120	15 ...135	15 ...150	15 .. 165	15 ...180
16 ... 32	16 ... 48	16 ... 64	16 ... 80	16 ... 96	16 ...112	16 ...128	16 ...144	16 ...160	16 ...176	16 ...192
17 ... 34	17 ... 51	17 ... 68	17 ... 85	17 ...102	17 ...119	17 ...136	17 ...153	17 ...170	17 .. 187	17 ...204
18 ... 36	18 ... 54	18 ... 72	18 ... 90	18 ...108	18 ...126	18 ...144	18 ...162	18 ...180	18 ...198	18 ...216
19 .. 38	19 ... 57	19 ... 76	19 ... 95	19 ...114	19 ...133	19 ...152	19 ...171	19 ...190	19 ...209	19 ...228
20 ... 40	20 ... 60	20 ... 80	20 ...100	20 ...120	20 ...140	20 ...160	20 ...180	20 ...200	20 ...220	20 ...240
21 ... 42	21 ... 63	21 ... 84	21 ...105	21 ...126	21 ...147	21 ...168	21 ...189	21 ...210	21 ...231	21 ...252
22 ... 44	22 ... 66	22 ... 88	22 ...110	22 ...132	22 ...154	22 ...176	22 ...198	22 ...220	22 ...242	22 ...264
23 ... 46	23 ... 69	23 ... 92	23 ...115	23 ...138	23 ...161	23 ...184	23 ...207	23 ...230	23 ...253	23 ..276
24 ... 48	24 ... 72	24 ... 96	24 ...120	24 ...144	24 ...168	24 ...192	24 ...216	24 ...240	24 ...264	24 ...288

MONEY TABLE.

£, denotes libra, pound; s, solidus, shilling; d denarius, penny; qr, quadrans, farthings.

Farthings		Pence.						Shillings.					
qrs.	*d.*	*d.*	*s.*	*d.*	*d.*	*s.*	*d.*	*s.*	*£*	*s.*	*s.*	*£.*	*s.*
4 are	1	12 are	1	0	96 are	8	0	20 are	1	0	92 are	4	12
5	1¼	14	1	2	100	8	4	22	1	2	94	4	14
6	1½	16	1	4	108	9	0	24	1	4	96	4	16
7	1¾	18	1	6	110	9	2	26	1	6	98	4	18
8	2	20	1	8	120	10	0	28	1	8	100	5	0
9	2¼	22	1	10	130	10	10	30	1	10	110	5	10
10	2½	24	2	0	132	11	0	32	1	12	120	6	0
11	2¾	26	2	2	140	11	8	34	1	14	130	6	10
12	3	28	2	4	144	12	0	36	1	16	140	7	0
13	3¼	30	2	6	150	12	6	38	1	18	150	7	10
14	3½	32	2	8	156	13	0	40	2	0	160	8	0
15	3¾	34	2	10	160	13	4	42	2	2	170	8	10
16	4	36	3	0	168	14	0	44	2	4	180	9	0
17	4¼	38	3	2	170	14	2	46	2	6	190	9	10
18	4½	40	3	4	180	15	0	48	2	8	200	10	0
19	4¾	42	3	6	190	15	10	50	2	10	210	10	10
20	5	44	3	8	192	16	0	52	2	12	220	11	0
21	5¼	46	3	10	200	16	8	54	2	14	230	11	10
22	5½	48	4	0	204	17	0	56	2	16	240	12	0
23	5¾	50	4	2	210	17	6	58	2	18	250	12	10
24	6	52	4	4	216	18	0	60	3	0	260	13	0
25	6¼	54	4	6	220	18	4	62	3	2	270	13	10
26	6½	56	4	8	228	19	0	64	3	4	280	14	0
27	6¾	58	4	10	240	20	0	66	3	6	290	14	10
28	7	60	5	0	300	25	0	68	3	8	300	15	0
29	7¼	62	5	2	400	33	4	70	3	10	310	15	10
30	7½	64	5	4	480	40	0	72	3	12	320	16	0
31	7¾	66	5	6	500	41	8	74	3	14	330	16	10
32	8	68	5	8	600	50	0	76	3	16	340	17	0
34	8½	70	5	10	700	58	4	78	3	18	350	17	10
35	8¾	72	6	0	720	60	0	80	4	0	360	18	0
36	9	74	6	2	800	66	8	82	4	2	370	18	10
38	9½	78	6	6	900	75	0	84	4	4	380	19	0
40	10	80	6	8	960	80	0	86	4	6	390	19	10
44	11	84	7	0	1000	83	4	88	4	8	400	20	0
48	12	90	7	6	1100	91	8	90	4	10	500	25	0

PRACTICE TABLES.

Of a Pound.

s.	*d.*		*£*
10	0	=	$\frac{1}{2}$
6	8	=	$\frac{1}{3}$
5	0	=	$\frac{1}{4}$
4	0	=	$\frac{1}{5}$
3	4	=	$\frac{1}{6}$
2	6	=	$\frac{1}{8}$
2	0	=	$\frac{1}{10}$
1	8	=	$\frac{1}{12}$
1	4	=	$\frac{1}{15}$
1	3	=	$\frac{1}{16}$
1	0	=	$\frac{1}{20}$
	10	=	$\frac{1}{24}$
	8	=	$\frac{1}{30}$
	$7\frac{1}{2}$	=	$\frac{1}{32}$
	6	=	$\frac{1}{40}$
	5	=	$\frac{1}{48}$
	4	=	$\frac{1}{60}$
	$3\frac{3}{4}$	=	$\frac{1}{64}$
	3	=	$\frac{1}{80}$
	$2\frac{1}{2}$	=	$\frac{1}{96}$
	2	=	$\frac{1}{120}$
	1	=	$\frac{1}{240}$
	$\frac{3}{4}$	=	$\frac{1}{320}$
	$\frac{1}{2}$	=	$\frac{1}{480}$

Of a Shilling.

d.		*s.*
6	=	$\frac{1}{2}$
4	=	$\frac{1}{3}$
3	=	$\frac{1}{4}$
2	=	$\frac{1}{6}$
$1\frac{1}{2}$	=	$\frac{1}{8}$
1	=	$\frac{1}{12}$
$\frac{3}{4}$	=	$\frac{1}{16}$
$\frac{1}{2}$	=	$\frac{1}{24}$
$\frac{1}{4}$	=	$\frac{1}{48}$

Of a Penny.

$\frac{1}{2}$	=	$\frac{1}{2}$
$\frac{1}{4}$	=	$\frac{1}{4}$

TROY WEIGHT.

Of a lb.

oz.		*lb.*
6	=	$\frac{1}{2}$

The same as of a Shilling.

Of an Ounce.

dwt.	*gr.*		*oz.*
10	0	=	$\frac{1}{2}$
6	16	=	$\frac{1}{3}$
5	0	=	$\frac{1}{4}$
4	0	=	$\frac{1}{5}$
3	8	=	$\frac{1}{6}$
2	12	=	$\frac{1}{8}$
2	0	=	$\frac{1}{10}$
1	16	=	$\frac{1}{12}$

Of a dwt.

gr.		*dwt.*
12	=	$\frac{1}{2}$
8	=	$\frac{1}{3}$
6	=	$\frac{1}{4}$
4	=	$\frac{1}{6}$
3	=	$\frac{1}{8}$
2	=	$\frac{1}{12}$

AVOURDUPOIS WEIGHT.

Of a Ton.

cwt.		*ton.*
10	=	$\frac{1}{2}$
5	=	$\frac{1}{4}$
4	=	$\frac{1}{6}$
$2\frac{1}{2}$	=	$\frac{1}{8}$
2	=	$\frac{1}{10}$
$1\frac{1}{4}$	=	$\frac{1}{16}$

Of a Cwt.

qr.	*lb.*		*cwt.*
2 or	56	=	$\frac{1}{2}$
1 —	28	=	$\frac{1}{4}$
	16	=	$\frac{1}{7}$
	14	=	$\frac{1}{8}$
	8	=	$\frac{1}{14}$
	7	=	$\frac{1}{16}$
	4	=	$\frac{1}{28}$

Of a qr.

lb.		*qr.*
14	=	$\frac{1}{2}$
7	=	$\frac{1}{4}$
4	=	$\frac{1}{7}$
$3\frac{1}{2}$	=	$\frac{1}{8}$
2	=	$\frac{1}{14}$

CLOTH MEASURE.

Of a Yard.

qr.	*n.*		*yard.*
2	0	=	$\frac{1}{2}$
1	0	=	$\frac{1}{4}$
	2	=	$\frac{1}{8}$
	1	=	$\frac{1}{16}$

LAND MEASURE.

Of an Acre.

r.	*p.*		*a.*
2	0	=	$\frac{1}{2}$
1	0	=	$\frac{1}{4}$
	32	=	$\frac{1}{5}$
	20	=	$\frac{1}{8}$
	16	=	$\frac{1}{10}$
	8	=	$\frac{1}{20}$
	4	=	$\frac{1}{40}$

QUANTITIES.

12 articles	make	1 dozen.
20 articles	——	1 score.
12 dozen	——	1 gross.
24 sheets, paper,	——	1 quire.
20 quires	——	1 ream.
2 reams	——	1 bundle.
12 skins, parchment	——	1 roll.

STERLING MONEY.

					dwt.	gr.
4 Farthings	make	1 Penny	marked *d.*	weighs	12	3.6
12 Pence	——	1 Shilling	—— *s.*	——	3	15.27
5 Shillings	——	1 Crown	—— *cr.*	——	18	4.36
20 Shillings	——	1 Pound	—— £.	——	5	3.27

Obsolete Coins.—A noble 6s.8d.; an angel 10s.; a mark 13s.4d.; a pistole 17s; a guinea 21s.; a carolus 23s.; a jacobus 25s.; a moidore 27s.; a johannes 36s.

The standard of gold coin is 22 parts of pure gold, and 2 parts of copper; the mint price is £3 17s. 10½d. per ounce. The current silver coin is 11 oz. 2 dwts. of pure silver, and 18 dwts. of copper; its value is 5s. 6d. per ounce.

Copper coin is not a legal tender for any sum above 12*d.*
Silver coin ....above 40*s.*
Gold coin is the only legal tender...........above 40*s.*

TROY WEIGHT.

					Troy gr.
4 Grains(*gr*)	make	1 Carat	marked	*carat*	4
6 Carats or 24 *gr.*		1 Pennyweight	——	*dwt.*	24
20 Pennyweights	—	1 Ounce	——	*oz.*	480
12 Ounces	——	1 Pound	——	℔.	5760

By this weight, gold, silver, and jewels are weighed

100 ℔. = 1 *cwt.* 20 *cwt.* = 1 *ton* of Gold or Silver.

The Troy pound weighing 5760 troy grains is the standard unit from which all other weights are derived.

APOTHECARIES' WEIGHT.

					grains.
20 Grains (*gr*)	make	1 Scruple	marked	*sc.* or ℈	20
3 Scruples	——	1 Dram	——	*dr.* or ʒ	60
8 Drams	——	1 Ounce	——	*oz.* or ℥	480
12 Ounces	——	1 Pound	——	℔.	5760

By this Weight, Apothecaries and Chemists compound their medicines, but buy and sell their drugs by Avoirdupois Weight.

A table-spoonful, cochlearium magnum, ℥ *ss.* (½ *oz.*) ʒ *iijss* (3½ *dr.*)

A dessert-spoonful, cochlearium mediocre, ʒ*ij.* (2 *dr.*) ʒ *iij.* (3 *dr.*)

A tea-spoonful, cochlearium parvum, ʒ *j*, (1*dr.*) ℈ *jss* (1½ *sc.*)

A tea-cup, vasculum pro thea, ℥ iij (3 oz.)

Gutta, a drop, ℞, (recipe) take, M, (misce) mix.

Apothecaries' Measure.—60 minims = 1 dram; 8 dr. = 1 oz.; 16 oz. = 1 pint.

AVOIRDUPOIS WEIGHT.

							drams.
16	Drams (*dr.*)	make	1	Ounce	marked	*oz.*	16
16	Ounces	——	1	Pound	——	℔.	256
14	Pounds	——	1	Stone	——	*st.*	3584
28	Pounds	——	1	Quarter	——	*qr.*	7168
4	Quarters or 112 ℔.		1	HundredWeight		*cwt.*	28672
20	Hundred Weights		1	Ton	——	*ton.*	573440

By this Weight groceries of all kinds, tallow, pitch, flax, silks, and all metals except Gold and Silver are weighed.

℔. Avoirdupois = 7000 grains. ℔. Troy = 5760 grains; the proportion to each other is as 17 is to 14.

A firkin of butter 56 ℔; a firkin of soap 64 ℔; a barrel of soap 256 ℔; a barrel of raisins, 112 ℔; a fother of lead in London and Hull, 19½ cwt.; at Chester, 20 cwt.; at Newcastle, 21 cwt.; at Bawtry, 21½ cwt.; and at Derby, 22½ cwt.; a hundred weight of lead, at Hull and Chester, 120 ℔; a stone of butcher's meat in London, 8 ℔; in the country, 14 ℔; a chest of tea, about 84 ℔; a faggot of steel, 120 ℔; a gallon of train oil, 9 ℔; a seam of glass, 120 lb.

Wool Weight.—7 lb. make 1 clove; 2 cloves or 14 lb. 1 stone; 2 stones 1 tod; 6½ tods 1 wey; 2 weys 1 sack; 12 sacks 1 last; 240 lb. 1 pack.

Hay and Straw Weight.—A truss of straw is 36 lb.: a truss of old hay, 56 lb.; a truss of new hay, 60 lb.; a load, 36 trusses. Hay is new until it has been cut three months.

Bread and Flour Weight.—A peck loaf, 17 lb. 6 oz.; a peck of flour, 14.44 lb.

CLOTH MEASURE.

							inches.
2¼	Inches (*in.*)	make	1	Nail	marked	*n.*	2¼
4	Nails or 9 *in.*	——	1	Quarter	——	*qr.*	9
4	Quarters or 36 *in.*		1	Yard	——	*yd.*	36
3	Quarters	——	1	Flemish Ell	——	*Fl. e.*	27
5	Quarters	——	1	English Ell	——	*E. e.*	45
6	Quarters	——	1	French Ell	——	*Fr. e.*	54
37	Inches	——	1	Scotch Ell	——	*Sc. e.*	37

Cotton Yarn Measure.—54 inches 1 thread, 80 threads 1 skein, 7 skeins 1 hank; 18 hanks 1 spindle. The reel is 54 inches in circuit.

Linen Yarn Measure.—90 inches 1 thread; 120 threads 1 cut; 2 cuts 1 heer; 6 heers 1 hasp; 4 hasps 1 spindle. The reel is 90 inches in circuit.

Worsted Yarn Measure.—36 inches 1 thread; 80 threads 1 lea or rap; 7 leas 1 hank or 560 yards. The reel is 36 inches in circuit.

LINEAL OR LONG MEASURE.

						Inches.
3	Barleycorns(*b.c.*)	make	1	Inch	marked	*in.*	
12	Inches	——	1	Foot	——	*ft.* 12
3	Feet or 36 Inches	……	1	Yard	……	*yd.* 36
6	Feet or 2 Yards	……	1	Fathom	……	*fath.* 72
5½	Yards	……	1	Pole	……	*p.* 198
40	Poles	……	1	Furlong	……	*fur.* 7920
8	Furlongs or 1760 Yards		1	Mile	……	*m.* 63360
3	Miles	……	1	League	……	*l.* 190080
60	Geographical Miles, or		1	degree		
69½	English Statute Miles					
360	Degrees	……………		The circumference of the Earth.		

A Hand, is 4 Inches; a Span, 9 Inches; a cubit, 1½ Feet; a Pace, 5 Feet; an Inch, 12 Lines; in Scotland, 1984 yards = 1 mile; in Ireland, 2220; in Russia, 1110; in Italy, 1467; in Poland, 4440; in Spain, 5028; in Germany 5866.

MEASURE OF CAPACITY.

							pints.	*cubic inches*
2	Pints (*pt.*)	make	1	Quart	marked	*qt.*	2	69.3185
4	Quarts	……	1	Gallon	……	*gal.*	8	277.274
2	Gallons	……	1	Peck	……	*pk.*	16	554.548
4	Pecks	……	1	Bushel	……	*bush*	64	2218.192
8	Bushels	……	1	Quarter	……	*qr.*	512	17745.536

By this Measure all liquids and dry goods are measured.

Formerly the wine gallon contained 231 cubic inches, the ale and beer gallon 282, and the gallon dry measure 268¾; these distinctions were abolished at the commencement of the year 1826, by an Act for establishing uniformity of Weights and Measures; the imperial gallon contains 10 pounds Avoirdupois Weight, of distilled water, at the temperature of 62· of Fahrenheit's thermometer.

Claret 63 *gal.* = 1 *hhd.*, Madeira 110, Vidonia 120, Sherry 130, Port 138, Lisbon 140.

Wine.	*Anker.*	*rundlet.*	*tierce.*	*hogshead.*	*puncheon.*	*pipe.*	*tun.*
Old Measure	10 gal.	18	42	63	84	126	252
New Measure	8¼—	15	35	52½	70	105	210

Ale and Beer.	*Firkin.*	*kilderkin.*	*barrel.*	*hogshead.*	*puncheon.*	*butt.*
Old Measure	9 gal.	18	36	54	72	108
New Measure	·9⅛—	18¼	36½	55	73	109¾

The standard bushel is 19½ inches in diameter, and 7.427 deep.

TIME.

				seconds
60 Seconds*(sec.)*	make	1 Minute	marked *min.*	60
60 Minutes	......	1 Hour	...... *hr.*	3600
24 Hours	......	1 Day	...... *dy.*	86400
7 Days	......	1 Week	...... *wk.*	604800
4 Weeks	......	1 Month	...... *mo.*	2419200
$13\frac{1}{28}$ Months or 365 days		1 Common Year	*yr.*	31536000
365¼ Days or 52*w* 1*d* 6*h*		1 Julian Year	*Jul yr.*	31557600
366 Days	......	1 Leap Year	*leap yr.*	31622400
365 Days 5*hr* 48*m* 47½*s*		1 Solar Year	*sol. yr.*	31556927½

January	31	April	30	July	31	October	31
February	28	May	31	August	31	November	30
March	31	June	30	September	30	December	31

30 days hath September, April, June, and November,
February has 28 alone, all the rest have 31,
Except in Leap-Year, at which time February's days are 29.

SQUARE OR LAND MEASURE.

				sq. inches.
144 Square Inches	make	1 Square Foot	marked *sq.ft.*	144
9 Square Feet	......	1 Square Yard	...... *sq.yd.*	1296
30¼ Square Yards	......	1 Sq. Pole or Perch	*sq.p.*	39204
40 Perches	......	1 Rood	...... *r.*	1568160
4 Roods, or 4840 sq. yards or 10 square chains	......	1 Acre	...... *a.*	6272640
640 Acres	......	1 Square Mile	*sq.m.*	4014489600

A rood of building is 7 yards; a rood of digging is 49 square yards; a square of flooring, 100 feet; a rod of brickwork, 272¼ feet; the chain 100 links, each link, 7.92 inches; 100000 square links, 1 acre.

By this Measure, every thing that has length and breadth, as land, paving, flooring, plastering, &c., is measured.

12 inches × 12 inches = 144 inches or 1 square foot.

CUBIC OR SOLID MEASURE.

1728 Cubic Inches	make	1 Cubic Foot	marked *cub. ft.*
27 Cubic Feet	......	1 Cubic Yard	...... *cub.yd.*
40 Cubic Feet of rough timber, or 50 Cubic Feet of hewn timber...		1 Ton or Load	*ton.*
42 Cubic Feet	.. ...	1 Ton of Shipping	
5 Cubic Feet	.. ...	1 Barrel Bulk.	...... *B. B.*
1 Cubic Yard of Earth		1 Load	

By this Measure, every thing that has length, breadth, and depth, is *measured.*

12 in. × *12 in.* × *12* in. = 1728 inches, or 1 cubic foot.

A CHRONOLOGICAL TABLE.

YEARS.						
G	F	E	D	C	B	A
			1846	1847		1848
1849	1850	1851		1852	1853	1854
1855		1856	1857	1858	1859	
1860	1861	1862	1863		1864	1865
1866	1867		1868	1869	1870	1871
	1872	1873	1874	1875		1876
1877	1878	1879		1880	1881	1882
1883		1884	1885	1886	1887	
1888	1889	1890	1891		1892	1893
1894	1895		1896	1897	1898	1899
1900	1901	1902	1903		1904	1905
1906	1907		1908	1909	1910	1911
	1912	1913	1914	1915		1916
1917	1918	1919		1920	1921	1922
1923		1924	1925	1926	1927	
1928	1929	1930	1931		1932	1933
1934	1935		1936	1937	1938	1939
	1940	1941	1942	1943		1944
1945	1946	1947		1948	1949	1950
1951		1952	1953	1954	1955	
1956	1957	1958	1959		1960	1961
1962	1963		1964	1965	1966	1967
	1968	1969	1970	1971		1972
1973	1974	1975		1976	1977	1978
1979		1980	1981	1982	1983	
1984	1985	1986	1987		1988	1989
1990	1991		1992	1993	1994	1995
	1996	1997	1998	1999		

SUNDAYS.							
January, October.	F 6	E 5	D 4	C 3	B 2	A 1	G 7
May.	E 4	D 3	C 2	B 1	A 7	G 6	F 5
August.	D 2	C 1	B 7	A 6	G 5	F 4	E 3
Feb., March, Nov.	C 7	B 6	A 5	G 4	F 3	E 2	D 1
June.	B 5	A 4	G 3	F 2	E 1	D 7	C 6
Septem. Decem.	A 3	G 2	F 1	E 7	D 6	C 5	B 4
April, July.	G 1	F 7	E 6	D 5	C 4	B 3	A 2

EXPLANATION.

For the year, 1847, the dominical letter is C, look for the same letter against any proposed month; say May, the Sundays in that month are on the 2nd, 9th, 16h, 23rd, and 30th, day.

In Leap Year, say 1848, for Jan. and Feb. use the letter B, and for the rest of the months use A.

A TABLE OF RECIPROCAL DISTANCES

Market.		London.	Ambleside.	Antwerp.	Bath.	Belfast.	Berwick.	Birmingham.	Blackburn.	Bolton.	Boulogne.	Brighton.	Bristol.	Brussels.	Calais.	Cambridge.	Carlisle.	Chester.	Cork.	Douglas	Derby.	Dublin.	Edinburgh.	Glasgow.	Hamburgh.	Hull.
W.	Ambleside.	272																								
W. S.	Antwerp.	210	440																							
F.	Bath.	105	251	316																						
S.	Belfast.	400	200	612	386																					
	Berwick.	333	131	482	363	215																				
M. Th. S.	Birmingham	110	165	320	90	290	265																			
W. S.	Blackburn.	208	68	390	191	237	186	103																		
M.	Bolton.	196	77	378	176	230	195	91	12																	
	Boulogne.	100	375	162	206	502	434	210	310	297																
Th.	Brighton.	54	328	220	120	455	390	163	262	250	110															
W. S.	Bristol.	120	246	330	14	357	352	87	206	195	220	135														
	Brussels.	208	483	32	314	610	542	318	417	405	160	262	328													
	Calais.	95	370	140	200	496	428	205	303	290	23	103	213	137												
W. S.	Cambridge.	51	245	228	144	383	288	97	174	162	142	105	142	260	145											
S.	Carlisle.	302	44	456	292	155	89	195	100	107	403	361	284	510	397	270										
W. S.	Chester.	180	108	390	155	235	225	75	51	39	280	234	150	390	275	170	138									
W. S.	Cork.	350	330	560	244	203	420	323	281	273	450	366	230	560	444	400	360	281								
	Douglas.	276	87	487	262	155	173	167	112	103	377	330	248	485	370	258	86	110	200							
F.	Derby.	126	150	311	130	383	225	40	79	67	227	180	126	335	221	96	173	72	357	159						
	Dublin.	320	205	532	295	80	294	212	157	150	422	375	277	530	416	303	235	157	124	76	203					
W.	Edinburgh.	392	136	541	284	170	59	288	191	200	493	446	376	600	487	350	93	231	373	178	266	250				
W. S.	Glasgow.	405	145	557	393	126	130	296	200	208	505	458	385	612	500	355	100	240	330	186	275	205	44			
	Hamburgh.	450	560	300	650	732	602	541	520	522	462	644	636	331	440	547	576	552	790	622	500	666	660	677		
T. F.	Hull.	170	138	300	234	312	182	121	100	98	270	224	216	380	265	127	156	132	371	201	82	247	241	257	420	
T. Th. S.	York.	195	103	336	226	274	144	128	74	71	296	250	215	404	290	170	112	104	340	173	88	218	201	213	457	38

ARITHMETICAL SIGNS.

$+$ Plus, or more, signifies Addition, as $3 + 1$ equal 4.
$-$ Minus, or less, ——— Subtraction, as $3 - 1$ equal 2.
$\times$ ——— Multiplication, 3×2 equal 6
$\div$ ——— Division, as $6 \div 2$ equal 3
$=$ ——— Equality, as $3 + 2 = 5$.
$:$ is to, $::$ so is, $:$ to — Proportion, as $1 : 2 :: 3 : 6$
——— As 1 is to 2, so is 3 to 6.
$\sqrt{4}$, $\sqrt[2]{4}$, or $4^{\frac{1}{2}}$ ——— The Square Root.
$\sqrt[3]{4}$, or $4^{\frac{1}{3}}$ ——— The Cube Root.
$\sqrt[4]{}$, or $4^{\frac{1}{4}}$ ——— The Biquadrate Root.
$\therefore$ Ergo, or therefore.

ARITHMETIC:

Arithmetic is the science of computing by numbers

The fundamental rules are, Notation or Numeration, Addition, Subtraction, Multiplication, and Division.

NOTATION AND NUMERATION.

Notation is the art of writing numbers in figures. Numeration is the art of reading, or writing such numbers in words.

NUMERATION TABLE.

1	Units.
21	Tens.
321	Hundreds.
4,321	Thousands.
54,321	Tens of Thousands.
654,321	Hundreds of Thousands.
7,654,321	Millions.
87,654,321	Tens of Millions.
987,654,321	Hundreds of Millions.
1,987,654,321	Thousands of Millions.
21,987,654,321	Tens of Thousands of Millions.
321,987,654,321	Hundreds of Thousands of Millions
4,321,987,654,321	Billions.

The above table may be extended to a greater length by writing the words billions, quadrillions, quintillions, sextillions, septillions, octillions, nonillions, decillions, &c., which are called periods, each period consisting of six figures, each period is divided into half periods, each period consisting of three figures.

Septil. Sextil, Quintil. Quadril. Trill. Bill. Mill. Units. Periods.
th. un. th. un. th. un. th. un. th. un. th. un. th. un. th. un. half periods.
321,987. 654,321. 987,654. 321,987.654,321.987,654.321,987,654,321. Figures.

EXERCISES IN NUMERATION,

Read or write down in words the following numbers.

* 19 60 45 69 96 150 1846.

† 174 5867 90675 400404 6372005 70070070
800800800 3003003 60000060 543210987 3030300
40000040 987654321 200000200200 3000003003003
60000060060060 83743927532361 22461573
9000000000009.

EXERCISES IN NOTATION.

Express in figures the following numbers.

1. † One hundred and seventy-four.

2. Five thousand, eight hundred and sixty-seven.

3. Ninety thousand, six hundred and seventy-five.

4. Four hundred thousand, four hundred and four.

5. Six millions, three hundred seventy-two thousand, and five.

6. Seventy millions, seventy thousand, and seventy.

7. Eight hundred millions, eight hundred thousand, and eight hundred.

8. Three millions, three thousand, and three.

9. Sixty millions, and sixty.

10. Five hundred forty-three millions, two hundred ten thousand, nine hundred and eighty-seven.

11. Three millions, thirty thousand, and three hundred

12. Forty millions, and forty.

13. Nine hundred eighty-seven millions, six hundred fifty-four thousand, three hundred and twenty one,

14. Two hundred thousand millions, two hundred thousand, and two hundred.

15. Three billions, three millions, three thousand, and three.

16. Sixty billions, sixty millions, sixty thousand, and sixty.

17. Eighty-three billions, seven hundred forty-three thousand, nine hundred twenty-seven millions, five hundred thirty-two thousand, three hundred and sixty-one.

18. Twenty-two millions, four hundred sixty-one thousand, five hundred and seventy-three.

19. Nine billions, and nine.

20. *XIX. LX. XLV. LXIX. XCVI. CL. MDCCCXLVI.

SIMPLE ADDITION.

Addition teaches to add two or more numbers into one sum.

Rule.—Place units under units, tens under tens, hundreds under hundreds, &c., draw a line under them, and say 8 and 7 make 15, 15 and 6 make 21, 21 and 5 make 26. Put down the right hand figure which is 6 and add the 2 to the next column; thus 2 and 5 make 7, 7 and 3 make 10, 10 and 9 make 19, 19 and 4 make 23. Set down the 23. The number 236 is called the sum.

$$\begin{array}{r} 45\\ 96\\ 37\\ 58\\ \hline 236\\ \hline\hline \end{array} \qquad \begin{array}{r} 45\\ \hline 96\\ 37\\ 58\\ \hline 191\\ \hline 236\\ \hline\hline \end{array}$$

Proof.—Reckon the figures downwards, and if the same, you may suppose the sum to be correct; or draw a line under the uppermost number and add the rest together, then add that sum to the uppermost number, which will be the same as before.

EXERCISES.

(1)	(2)	(3)	(4)
487625	632457	743542	683254
835276	754236	245386	452386
291654	463725	791854	648532
* 356478	* 976468	* 827693	* 957489
401264	256432	145347	205635
164724	245764	754614	547614
708346	536275	208146	351468

(5)	(6)	(7)	(8)
735824	987654	847236	123456
428537	321098	734564	789012
743285	765432	278421	345678
864793	893756	937264	938462
153065	312346	152764	765433
571463	278902	454325	210988
256715	223457	421579	654322

---

* The answers to the first 42 sums will be found by subtracting 1 from each figure in the fourth or middle line, and prefixing a 3; thus, 3245367—3865357—3716582—3846378 are the answers to *the first* four sums.

(9) 463275
572364
854726
532469
425614
427636
145274

(10) 532674
476235
824673
587946
356215
523765
175327

(11) 624725
527468
735624
849276
264164
472532
264376

(12) 743576
567964
495248
749653
145313
432036
504752

(13) 485627
547862
874356
935847
403262
452138
125644

(14) 574286
635724
847548
574674
314603
364276
152452

(15) 827649
584976
435642
976483
172351
415024
453247

(16) 827456
453278
784537
965764
172544
435611
215463

(17) 345762
738435
487869
928657
543127
261565
512131

(18) 749286
357493
862748
493687
250714
542507
126141

(19) 734268
487634
865268
794685
154621
512366
134732

(20) 534872
768694
437248
659735
354017
231306
562752

(21) 649374
285748
561486
784638
350626
603141
438514

(22) 564786
728472
846854
739467
324103
271528
153146

(23) 847658
753462
638574
794865
141231
246538
261426

(24) 735486
461862
843624
938167
153403
538138
156376

(25) 493786
687462
754624
839476
506214
312538
134265

(26) 478637
836264
673428
927167
410252
163736
326572

(27) 543742
756484
412768
837249
345147
243516
587232

(28) 524673
248346
487682
943876
475327
640543
51231

(29)	(30)	(31)	(32)
367483	528746	483768	614783
724876	346492	876436	328476
538642	653784	642862	656842
719263	796457	789486	947685
521406	360143	405121	274106
275124	653508	123564	671524
461358	346216	357138	343158

33. How many do 524653, 743548, 486156, 964742, 364236, 256452, and 513844 make ?

34. What is the sum of 548376, 487652, 765324, 689475, 340513, 512348, and 234676 ?

35. Collect into one sum 427653, 865416, 724782, 918276, 461236, 134584, and 275218.

36. 743765 + 686541 + 573182 + 768945 + 145124 + 313459 + 426818.

37. 546724 + 683468 + 376836 + 918657 + 342165 + 316532 + 623164.

38. What is the amount of two hundred and forty-six, three hundred and sixty-two, four hundred and seventy-eight, nine hundred and thirty-seven, six hundred and forty-three, six hundred and thirty-eight, and five hundred and twenty-two ?

39. There are 36 scholars above 6 years old, 48 above 8, 21 above 10, 57 above 12, 53 above 14, 52 above 16, and 79 above 18—James, tell me how many scholars there are in the school.

40. A clothier sold 54 yards of cloth on Monday ; 68 on Tuesday ; 76 on Wednesday ; 96 on Thursday ; 35 on Friday ; 32 on Saturday in the forenoon, and 24 in the afternoon ; how many yards did he sell during the week ?

41. An orange-dealer sold 7 chests of oranges ; in one chest there were 476 oranges ; in another 584 ; in another 768 ; in another 987 ; in another 413 ; in another 416 ; in the remaining one 232 ; how many oranges did he sell ?

42. A farmer paid £436 for 16 horses, £279 for 14 cows, £684 for 300 sheep, £576 for 100 oxen, £453 for 20 waggons, £721 for agricultural utensils, £316 for manure ; how much money did he pay ?

43. In 1844 the annual receipts of revenue of the following municipal boroughs were, Manchester, £59876; Leeds, £23203; Liverpool, £395779; Hull, £31391; Bath, £21481; Lancaster, £2346; York, £6081; Chester, £7881; Lincoln, £11982; Norwich, £15952; Newcastle, £56157; Derby, £8882; Doncaster, £10996; Sheffield, £3986; required the amount of the whole. Ans. £655993.

44. In 1841 the population of England and Wales was 15901981; Ireland, 8205382; Scotland, 2624586; France, 34000000; Spain, 14000000; Belgium, 4000000; Hanover, 1613037; Holland, 2700000; Prussia, 14907091; Sweden and Norway, 3980000; Portugal, 3800000; Saxony, 1652114; America, 46492000; Australia, 2695400; what is the population of the whole. Ans: 156571591.

45. England sends to the House of Commons, from the Counties, 143 Members, from the Boroughs, 323, from the Universities 4, and from the Isle of Wight 1; Wales sends from the Counties 15, and from the Boroughs 14; Scotland sends from the Counties 30, and from the Boroughs 23; Ireland sends from the Counties 64, from the Boroughs 39, and from the Universities 2; how many representatives are there? Ans. 658.

46. In the House of Lords there are 2 Peers of the Royal Blood, 21 Dukes, 19 Marquises, 109 Earls, 18 Viscounts, 192 Barons, 2 Archbishops, 24 Bishops, 16 Scotch Representative Peers, 28 Irish Representative Peers, and 4 Irish Spiritual Peers; how many Peers does the House consist of? Ans. 435.

47. A traveller went by railway on Monday from Hull to Selby 31 miles, on Tuesday from Selby to Leeds 20, on Wednesday from Leeds to Manchester 50, on Thursday from Manchester to Birmingham 80, on Friday from Birmingham to London 112, and on Saturday from London to Bristol 119; how many miles did he travel during the week? Ans. 412.

48. In London there are 16502 shoemakers, 14552 tailors, 2391 blacksmiths, as many whitesmiths as blacksmiths, 5030 house-painters, 1076 fish-dealers, 2662 hatters, 13208 carpenters, 6822 bricklayers, as many cabi-

net-makers as bricklayers, 2180 sawyers, as many jewellers and 500 more, 4277 grocers, 1393 stationers, 4199 linen-drapers, and 5655 bakers; the aggregate of the persons thus employed in the metropolis is required. Ans. 91840.

49. The diameter of the Sun is 883000 miles, of Mercury 3179, of Venus 7643, of the Earth 7958, of the Moon 2146, of Mars 4198, of Jupiter 89898, of Saturn 76438, and of Herschel 37465; what is the sum of these diameters. Ans. 1111925.

50. The highest mountains in Europe are Mont Blanc 15668 feet above the level of the sea; Mont Rosa 15527, Schrekhorn 13310, and Ortler Spitz 12852: in Asia Chimularee 29000, Dhawalagiri 28074, Javaher 25800, and Hindo-Coosh 20000; in Africa Mount Hentet 15000, Cameroon 13000, Teneriffe 12176, and Snowy Mount 10250; in America Sorata 25250, Illimani 24200, Chimborazo 21436, and Cayambe 19625; what is the amount of these heights? Ans. 301168.

51. The longest rivers in Europe are the Volga 2040 miles, the Danube 1800, the Dnieper 1150, and the Don 1020; in Asia the Yangtsekiang 3000, the Yenisei 2900, the Oby 2800, and the Hoang Ho 2400; in Africa the Nile 2750, the Niger 2300, the Congo 1400, and the Orange 1050; in America the Missouri 4265, the Amazon 3300, the Mississippi 3160, and the La Plata 2130; the sum of these lengths is required. Ans. 37465.

52. The population of London is 1521436, of New York 320000, of Edinburgh 166764, of Dublin 305112, of Madrid 206000, of Paris 987476, of Frankfort 61987, of Copenhagen 119894, of Vienna 387496, of Mecca 33798, of Amsterdam 210976, of Hanover 27968, of Hamburgh 121943, of St. Petersburgh 467974, of Stockholm 79846, of Berne 20948, of Warsaw 149897, of Lisbon 262974, of Berlin 351541, of Dresden 69849, and of Rome 153987; how many inhabitants do these cities contain? Ans. 6027866.

53. The population of Manchester is 182800, of Liverpool 165247, of Birmingham 146286, of Leeds 123187, of Sheffield 59273, of Bristol 59186, of Newcastle 42372,

of Bath 38472, of Hull 36374, of Preston 35431, of Blackburn 27274, of York 26431, of Cambridge 21184, and of Oxford 20165; what is the sum of the whole? Ans. 983682.

54. According to a recent census of the United States of America; the free white population is 7249266 males, 6939842 females; the free coloured population is 186476 males, 199769 females; the slave-population is 1246408 males, 1240805 females; persons on board of vessels 6100; the amount is required. Ans. 17068666.

55. Mercury is distant from the Sun 36000000, Venus 68000000, the Earth 95000000, Mars 142000000, Jupiter 485000000, Saturn 890000000, and Herschel 1800000000; what is the amount of these distances? Ans. 3516000000 miles.

56. The Andes is 4500 miles in length, the mountains of the moon 2000, the Appenines 700, the Alps 660, the Pyrenees 200; the sum of the lengths of these mountains is required?

57. The national debt of England is eight hundred and five millions of pounds sterling, France two hundred and twenty millions, Austria eighty five millions, Holland eighty two millions, Spain seventy five millions, Russia sixty millions, Belgium fifty millions, Prussia twenty six millions, Naples twenty millions, Denmark four millions one hundred and fifty thousand, Greece four millions six hundred and nine thousand, and Portugal three millions five hundred thousand; required the sum of these several European public debts. Ans. 1435259000.

58. Trajan's bridge is 10000 feet in length, Washington 5300, Strasburg 3390, Belfast 2500, Cologne 2330, Bourdeaux 1620, Lyons 1560, Warsaw 1500, Waterloo 1223, Westminster 1220, Menai 1050, Blackfriars 995, London 950, Vauxhall 860, Berwick 804, Southwark 708, Sunderland 236; what is the amount of the lengths of these bridges?

59. The tower of Babel is said to have been 843 feet high, one of the Pyramids of Egypt is 500 feet in height, *St. Stephen's* spire, Vienna 453, the cupola of St. Peter's, *Rome 434, Salisbury* spire 410, Norwich spire 315, Ca-

thedral of St. Paul's, London 364, St. Michael's spire, Coventry 303, Lincoln tower 300, Chichester spire 297, Grantham spire 288, Louth spire 282, Ely spire 270, Lichfield spire 258, St. Bride's, London 242, Wakefield spire 240, Canterbury tower 235, Gloucester tower 222, Glasgow spire 220, Durham tower 214, York tower 213, Goole spire 205, London monument 202, Porcelain tower, Nankin 200, Newcastle tower 194, the leaning tower at Pisa 188, St. Mary's tower, Oxford 180, Lynn spire, 170, Edinburgh spire 161, the cataract of Niagara 137, Colossus of Rhodes 123, Pompey's pillar 114; the sum of these heights is required.

60. St. Peter's Cathedral, Rome, is 730 feet in length and 520 feet in breadth, Winchester 545 long and 186 broad, Ely 535 long and 190 broad, Lincoln 498 long and 252 broad, York 524 long and 222 broad, Canterbury 514 long and 178 broad, St. Paul's, London 524 long and 286 broad, Salisbury 478 long and 77 broad, Peterborough 470 long, and 220 broad, Lichfield 411 long and 153 broad, Norwich 411 long and 190 broad, Gloucester 444 long and 171 broad: what is the sum of the lengths, and the amount of the breadths of these buildings.

61. There entered into a city 67483 infantry, 5387 horse, 86473 dragoons, 5437 light horse, 972 artillery, 1247 pioneers, and 783 sappers; how many in the whole ?

62. The component parts of the national income received during the year ending 5th April, 1846, are Customs £17664618, Excise £11886085, Stamps £7095521, Assessed and Land Taxes £4224039, Property and Income Tax £5084741, Post Office £768000, Crown Lands £130000, Miscellaneous £939747, Imprest and other Monies £170846, Re-payments of Advances £1516887, the year's total income of the United Kingdom is required ? Ans. 49480484.

63. The Normans ascended the English throne, A.D. 1066, and held the monarchy 69 years, the house of Blois 19 years, the Plantagenet race, or the Saxon line restored 245 years, the house of Lancaster 62 years, the

line of York 24 years, the house of Tudor, or the two families of York and Lancaster united 118 years, the race of Stuart, or the union of England and Scotland, 111 years, and the house of Brunswick, whom God preserve, has been in possession of the throne 132 years; in what year did each line begin to reign?

Ans. A.D. 1066, 1135, 1154, 1399, 1461, 1485, 1603, 1714.

64. The annual consumption of pit coal in Great Britain is stated to be 23669400 tons, of wheat 15000000 quarters, of meat 10250000 head of cattle sheep and pigs, of tea 30000000 ℔, of sugar 448000000 ℔, of coffee 20000000 ℔, of soap 114000000 ℔, of candles 117000000 lb.; the sum is required.

Ans. 777919400.

65. In the year 1838 there died in Yorkshire of fever 1615 persons, of small-pox 1113, of measles 1035, of hooping-cough 770, of consumption 5528, of pneumonia 1498, of all other classes of respiratory organs 1159, of diseases of the brain, nerves, and senses 5936, of digestive organs 1932; the total is required.

Ans. 20586.

SIMPLE SUBTRACTION.

Subtraction teaches to take a less number from a greater, whereby the difference is found.

Rule.—Place the less number under the greater, so that units may stand under units, tens under tens, &c., draw a line under them. Begin at the unit's place and say 3 from 6 and 3 remain, put down the 3 under the 3. Proceed to the next figure which is 5, take 5 from 3, this cannot be done, when this is the case, add 1 to the left hand side of the upper figure, which will make it 13, say 5 from 13 and 8 remain, put down the 8. Whenever 1 has been borrowed it must be added to the next bottom figure, thus, add 1 to 8 which makes 9, take 9 from 4 it cannot be done, as before place 1 before the 4, which makes it 14, take 9 from 14 and 5 remain, put down the 5. Add 1 to 2 it will make 3. Take 3 from 7 and 4 remain, put down

$$\begin{array}{r} 7\overset{1}{4}\overset{1}{3}6 \\ 2853 \\ \hline 1583 \\ \hline 7436 \\ \hline\hline \end{array}$$

the 4. 7436 is called the Minuend, 2853 the Subtrahend, and 4583 the difference. Add the Subtrahend and the Difference together and they will be equal to the Minuend when the work is right.

EXERCISES.

(1) 4311	(2) 7641	(3) 13716	(4) 18882	(5) 22308
1437	2547	4572	6294	7436
*				

(6) 835388246283	(7) 145170535896	(8) 903121518210
278462743761	48390178632	301040506070
(9) 370370367036	(10) 159538595385	(11) 217449646296
123456789012	53179531795	72483215432
(12) 129773589729	(13) 240141019500	(14) 823704965283
43257863243	80047006500	274568321761
(15) 296296296327	(16) 90120150210	(17) 742054316217
98765432109	30040050070	247351438739
(18) 943541437245	(19) 642454851543	(20) 218472758784
314513812415	214151617181	72824252928
(21) 146288845116	(22) 644290642356	(23) 141875503881
48762948372	214763547452	47291834627
(24) 743689643496	(25) 943730497434	(26) 224497639026
247896547832	314576832478	74832546342
(27) 143589743607	(28) 154200902103	(29) 102302101902
47863247869	51400300701	34100700634

30. 74628644962897371702—24876214987632457234.
31. From 29629629632962962 take 9876543210987654
32. From 12001800210027000 take 4000600070009000
33. From 15120906031821240 take 5040302010607080
35. Take 4123671487682471 from 12371014463047413
34. Take 1234567890123456 from 3703703670370368.
36. Take 1020304050607080 from 3060912151821240.

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* *The answers to these 36 sums equal twice the Subtrahend.*

37, From 784365+215635 take 345628+435276.
Ans. 219096,

38. From 582743+306145 take 274567+408634.
Ans. 205687.

39. Take 345671+176574 from 745842+217463.
Ans. 441060.

40. Take 708090+192939 from 834765+165234.
Ans. 98970.

41. John was born in the year 1807; how old will he be in the year 1864?

42. Columbus discovered America in 1492; how many years is it to this present time?

43. Samuel lent James £4862; of this sum he received back at one time £777, at another time £888; how much has James yet to pay? Ans. £3197.

44. A person had 100 oranges; of these 17 were lost 26 were stolen, and 9 he sold; how many remained?
Ans. 48.

45. On a cherry-tree there were 1004 cherries; the wind blew off five score and eight, a bad boy stole five dozen and eight, a branch broke off having five hundred and eight on; how many cherries are there remaining on the tree? Ans. 320.

46. Shakspeare died in 1616, and Sir Isaac Newton in 1727; how many years did Shakspeare die before Newton, and how many years elapsed between each of these events and 1846?
Ans. 111; 230; and 119 years.

47. Your grandfather is 89 years of age, your father 52, you are not so old as your grandsire by three score years; what is the difference between your father and you? Ans. 23 years.

48. The world was created 4004 years before Christ, Troy was built 1480, B. C., Carthage 1233, London 1108, Solomon's Temple 1008, and Rome 744; in what year of the world did each of these first exist?
Ans. 2524; 2771; 2896; 2996; and 3260.

49. Magellan commenced his voyage round the world *in 1519, Drake* in 1580. Anson in 1744, Cooke in *1771; what* number of years between each of those

dates and 1833, when Captain Ross returned in search of a N. W. passage. Ans. 314; 253; 89; 62.

50. Church clocks and bells were first used in England, A. D., 618, musical notes 1070, writing on paper 1110, glass windows 1180, spectacles 1299, the mariner's compass 1302, coal 1307, cloth-weaving 1331, cannons and gunpowder 1340, oil painting 1343, printing 1462, pins 1543, needles 1545, telescopes 1549, coaches 1555, watches 1597, tobacco 1598, barometers 1643, air-pumps 1653, diving bell 1658, tea 1666, railways made of wood were first used at Newcastle 1680, steam-engine 1705, gas-light 1807; how many years have elapsed since each of these remarkable events to the present year?

51. How many more days are there in the last six months than in the first six? Ans. 3.

52. Take ten millions from ten billions.
Ans. 9999990000000.

53. How many chapters and psalms does the Old Testament exceed the New? Ans. 669.

54. A vessel left Liverpool for America with 478 emigrants, at Cork she took on board 222 passengers: during her first week's voyage 137 returned in a London trader, and a score were washed overboard; during the second week 5 births took place, two fine boys and three lively girls, and a dozen and a half died; on the first day of the third week a score of playful boys fell into the hold and were killed; on the second day a hundred and a half sailed for Jamaica; on the third day a dozen were killed by the falling of the mast; on the fourth day coming in sight of land two died through excess of joy; how many arrived safe at New York?
Ans. 346.

55. A linen-draper had one thousand yards of Irish cloth; on Monday he sold twelve score yards, on Tuesday twelve dozen yards, on Wednesday as much as the two previous days, on Thursday half a dozen of yards, on Friday half a score of yards, on Saturday as many as on Tuesday; how many yards had he remaining?
Ans. 72.

56. In England there are 7321875 males, and 7673633 females; in Wales 447533 males, and 463788 females; in Scotland 1246427 males, and 1382530 females; how many more females than males are there in Great Britain? Ans. 504116.

57. The globe we inhabit contains 198956786 square miles of land and water, of which there are 134724573 of water; what quantity of land is there?

58. There are in England 2753295 houses inhabited, and 162756 uninhabited; in Wales 188196 inhabited, and 10133 uninhabited; in Scotland 513357 inhabited, and 24317 uninhabited; what is the difference between the sum of the inhabited and the uninhabited houses? Ans. 3257642.

59. The slave trade commenced in 1442 and was abolished in the British colonies in 1834; how long did this nefarious practice exist?

60. A boy had six score marbles, on Monday he lost one score, on Tuesday he won a dozen, on Wednesday he lost four score, on Thursday he won half a hundred, on Friday he lost as many as he had won on Tuesday, on Saturday he won as many as he did on Thursday; how many marbles had the boy at the conclusion of the week? Ans. 120.

61. How much does a billion and a half exceed a million and a half? Ans. 1499998500000.

62. The population of Greenock is 35921, Paisley 48125, Aberdeen 62900, Dundee 63825, Perth 18281, what is the difference between the sum of these towns and the sum of the two most populous cities in Scotland, Edinburgh 133692, and Glasgow 257502 inhabitants? Ans. 162142.

63. Kingston in Jamaica contains 52000 inhabitants what number must be added to make 305112 the population of Dublin?

64. In 1842 the national income amounted to £51120040, and the expenditure to £55195159; in 1843 the income amounted to £56935022, and the expenditure to £55501740; in 1844 the income amounted to £58590217, and the expenditure to £55103647; how

much does the aggregate surplus of these two last mentioned years exceed the deficiency of 1842. Ans £844733.

65. In 1845 there were in January 21 fair days and ~~10 rainy days,~~ in February 20 fair and 8 rain, in March 24 fair and 7 rain, in April 19 fair and 11 rain, in May 14 fair and 17 rain, in June 19 fair and 11 rain, in July 14 fair and 17 rain, in August 12 fair and 19 rain, in September 17 fair and 13 rain, in October 17 fair and 14 rain, in November 17 fair and 13 rain, and in December 12 fair and 19 rain; how many more fair than rainy days during the year? Ans. 47.

66. In 1856 my age will be exactly twenty-three,
What will my age be in 1874, tell, or ne'er see me more.
Ans. 41.

SIMPLE MULTIPLICATION.

Multiplication compendiously performs the office of many additions.

Rule.—Put the number by which you are to multiply under the number to be multiplied; then say 4 times 6 are 24. Put down the 4 and carry the 2. Then 4 times 7 are 28 and the 2 of the 24 make 30. Put down the 0 and carry the 3. Then 4 times 3 are 12 and add the 3 of the 30 make 15. Put down the 15. The 376 is called the Multiplicand; the 4 the Multiplier; the 1504 the Product. The multiplicand and multiplier are generally termed the Factors; thus 376 and 4 are factors.

Proof.—Divide the product by the multiplicand and the quotient will be the same as the multiplier: or change the multiplier into the multiplicand, and the multiplicand into the multiplier; this product will be the same as before, if the operation be correct: or cast out the nines from the two factors, the remainders put on each side of a cross, multiply the figures on each side together, cast out the nines from the product, and put the overplus at the top, then cast out the nines from the total product and its remainder place at the bottom, if the top and bottom figures agree, the work is supposed to be *right.*

	376	(Case 2) 428	(Case 3) 574	
7	4	4 × 4 = 16	263	
1 × 1	1504	1712	1722 =	3 times mult
4		4	3444 =	60 times do.
		6848	1148 =	200 times do.
			150962 =	263 times do.

(1) 578469	(2) 497854	(3) 694783	(4) 782146
* 2	3	4	5
(5) 837429	(6) 987654	(7) 321098	(8) 407060
6	7	8	9
(9) 516171	(10) 824576	(11) 918273	
10	11	12	

12. Multiply 987654321 by 4
13. Multiply ——— by 6
14. Multiply ——— by 8
15. Multiply ——— by 10
16. Multiply ——— by 12
17. Multiply ——— by 3
18. Multiply ——— by 5
19. Multiply ——— by 7
20. Multiply ——— by 9
21. Multiply ——— by 11
22. Multiply ——— by 2
23. Multiply 9482756312 by 2
24. Multiply ——— by 5
25. Multiply ——— by 7
26. Multiply ——— by 9
27. Multiply ——— by 4
28. Multiply ——— by 6
29. Multiply ——— by 3
30. Multiply ——— by 8
31. Multiply ——— by 12
32. Multiply ——— by 11
33. Multiply ——— by 10
34. Multiply 908070605040 by 7, 9, 5, 11, 8, 12, and 6 continually.
35. Multiply 123456789 by 9, 8, 7, 6, 5, 4, 3, and 2 continually.
36. Multiply 987654321 by 2, 3, 4, 5, 6, 7, 8, and 9 continually.

Case 2.—When the multiplier is a composite number.

Rule.—Multiply by one of the component number, and that product by the other, &c., the last product will be the answer.

37. Multiply 59476837 by 15
38. Multiply ——— by 16
39. Multiply ——— by 18
40. Multiply ——— by 24
41. Multiply ——— by 27
42. Multiply ——— by 54
43. Multiply ——— by 81
44. Multiply ——— by 72
45. Multiply ——— by 36
46. Multiply ——— by 64
47. Multiply ——— by 42
48. *Multiply* ——— by 96
49. *Multiply* ——— by 56
50. Multiply 789463278549 by 21
51. Multiply 987654321098 by 25
52. Multiply 908070605040 by 32
53. Multiply 840062004700 by 33
54. Multiply 764178698645 by 44
55. Multiply 480780670839 by 48
56. Multiply 974623584758 by 55
57. Multiply 463784698462 by 66
58. Multiply 758463287589 by 84
59. Multiply 531937648763 by 88
60. Multiply 847692457386 by 108
61. Multiply 358427934752 by 132
62. Multiply 973645786947 by 144

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* *The answers to these 62 sums will be found in the corresponding exercises, Simple Division,* 1156938.

Case 3.—When the multiplier contains several figures.

Rule.—There must be as many products as there are figures in the multiplier, observing to put the first figure of every product under that figure you multiply by. Add the several products together for the total product.

63. Multiply 4897634782 by 467. Ans. 2287195443194

64. Multiply 5428357468 by 689. Ans. 3740138295452

65. Multiply 4837568273 by 395. Ans. 1910839467835

66. Multiply 7463829465 by 587. Ans. 4381267895955

67. Multiply 53478639 by 4827. Ans. 258141390453

68. Multiply 79345786 by 9365. Ans. 743073285890

69. Multiply 48576392 by 4673. Ans. 226997479816

70. Multiply 92837465 by 8456. Ans. 785033604040

71. Multiply 54763782 by 5748. Ans. 314782218936

72. Multiply 73486547 by 8973. Ans. 659394786231

73. Multiply 487632 by 570069. Ans. 277983886608

74. Multiply 583294 by 609070. Ans. 355266876580

75. Multiply 947638 by 548007. Ans. 519312257466

76. Multiply 756489 by 470009. Ans. 355556638401

77. Multiply 549386 by 820706. Ans. 450884386516

78. Multiply 607040 by 709060. Ans. 430427782400

79. Multiply 480006 by 890007. Ans. 427208700042

80. Multiply 650700 by 748000. Ans. 486723600000

81 Multiply ninety millions ninety thousand and ninety, by nine millions nine thousand and nine.
Ans. 811622431620810.

82. In a parish there are 476 schools in each school there are 89 scholars; how many children are there under education in the parish? Ans. 42364.

83. A draper sells goods to the amount of £49 per week; how much does he sell during the year?

84. A farmer sold 987 tons of potatoes at £3 per ton; how much did he receive for the whole?

85. A butcher bought a dozen of oxen at £16 per ox, a score of sheep value £2 each, half a score of calves at £3 per calf, and half a dozen of pigs value £5 each; what money did he pay? Ans. £292.

86. In a pack of hounds there are 279 dogs; how many feet are there?

87. There are 1760 yards in a mile, how many yards between London and York the distance being 196 miles?
Ans. 344960.

88. There are two men, one of them rises at 6 o'clock every morning, and the other at 9; how many hours does the early riser gain of the other in a year?
Ans. 1095.

89. The hammer of a clock strikes 156 times in a day; how often in a year? Ans. 56940.

90. A merchant bought 8 hogsheads of porter, 7 hogsheads of cider, 6 hogsheads of black beer, 5 hogsheads of ale, and 4 hogsheads of table beer, each hogshead containing 24 dozens of bottles; how many bottles will be required for the whole? Ans. 8640.

91. If 6 steam-packets sail regularly twice a week from Hull to London, and return; each on an average conveys 127 passengers each way; what number of passengers are annually conveyed? Ans. 158496.

92. In an orchard 236 yards long and 78 yards broad there are 8 rows of apple-trees, in each row 24 trees, and on each tree 189 apples; how many square yards does the orchard contain, and how many apples are there on all the trees?
Ans. 18408 square yards; 36288 apples.

93. What is the continual product of 34, 76, 184, and 7465? Ans. 3549279040

94. A person for the last threescore years has travelled half a score of miles per day; how many miles has he travelled, exclusive of Sundays? Ans. 187800.

95. England contains 40 counties, suppose there are 46 parishes in each county, 1359 houses in each parish, and 6 persons in each house; the number of inhabitants is required? Ans. 15003360.

96. In the partition of lands in an American settlement, A had 946 acres allotted to him, B 1897, C 18374, D 9784, E 13418, F 6749, G 15749, and H 7693 acres, the sum of these allotments wanted 864 acres of one sixth of the whole; how many acres did the settlement contain? Ans. 452844.

97. Suppose the trains leave Leeds and Manchester six times a-day from each town, each train consisting of 12 carriages, and each carriage containing 12 persons; how many persons are annually conveyed between these towns, reckoning only week-days? Ans. 540864.

98. If a boy can point 15789 pins in an hour; how many can he point in 28 days allowing 8 working hours a-day? Ans. 3536736.

99. How many persons can stand on a square mile, supposing four, on an average, occupy one square yard? Ans. 12390400.

SIMPLE DIVISION.

Division teaches to find how often one number is contained in another.

Rule.—Put the numbers down. Then say 5 in 4 is none, 5 in 43; there are 8 fives in 43 and 3 over. Put down the 8 under the 3. Place the 3 which was over before the next figure 2 which will make it 32. Say 5 in 32; there are 6 fives in 32 and 2 over; put down the 6 under the 2. Put the 2 which was over before the 1 which will make it 21; then say 5 in 21; there are 4 fives in 21 and 1 over; put down the 4 under the 1, and the 1 which was over place it at the end. 1 is called the Remainder; 864 the Quotient; 4321 the Dividend; and 5 the Divisior.

Proof.—Multiply the quotient by the divisor and add the remainder, and if it comes the same as the dividend the work is right, or subtract the remainder from the dividend, and divide the difference by one of the factors and it will give the other: or, Multiply the excess of nines in the division, by the excess of nines in the quotient, and add the excess of nines in the remainder, put the excess of nines of the product on the top of the cross, and if the excess of nines be the same in the dividend, the operation is correct.

$$\begin{array}{r} {}^{4\,3\,2} \\ 5)\underline{4321} \\ 864\text{-}1 \\ \underline{5} \\ 4321 \end{array}\ \textit{Proof.} \qquad 5 \times 0 \overset{1}{\underset{1}{\times}} + 1 \qquad 504\left\{\begin{array}{c|l} 9 & 9876 \\ \times & \overline{1097—3} \\ 8 & \\ \times & \overline{137—1\times9+3=1} \\ 7 & \overline{19—4\times1\times9+8=300} \end{array}\right. \quad (\textit{Case } 2.)$$

(1) 2)1156938 *
(9) 3)1493562
(3) 4)2779132
(4) 5)3910730

(5) 6)5024574
(6) 7)6913578
(7) 8)2568784
(8) 9)3663540

(9) 10)5161710
(10) 11)9070336
(11) 12)11019276

12. Divide 3950617284 by 4
13. Divide 5925925926 by 6
14. Divide 7901234568 by 8
15. Divide 9876543210 by 10
16. Divide 11851851852 by 12
17. Divide 2962962963 by 3
18. Divide 4938271605 by 5
19. Divide 6913580247 by 7
20. Divide 8888888889 by 9
21. Divide 10864197531 by 11
22. Divide 1975308642 by 2
23. Divide 18965512624 by 2
24. Divide 47413781560 by 5
25. Divide 66379294184 by 7
26. Divide 85344806808 by 9
27. Divide 37931025248 by 4
28. Divide 56896537872 by 6
29. Divide 28448268936 by 3
30. Divide 75862050496 by 8
31. Divide 113793075744 by 10
32. Divide 104310319432 by 11
33. Divide 94827563120 by 12

34. Divide 1812363636363033600 by 6,12,8,11,5, 9,& 7, continually
35. Divide 44799999592320 by 2, 3, 4, 5, 6, 7, 8, & 9, continually
36. Divide 35840000004480 by 9, 8. 7, 6, 5, 4, 3, & 2, continually

Case 2.—When the Divisor is a composite number.

Rule.—Divide by one factor and that quotient by the other. To find the true remainder multiply the first divisor and the second remainder together add the first remainder if any to the product. Should there be three divisors multiply the last remainder by the second divisor and that product by the first divisor, add the second true remainder and the result will give the final true remainder; 9876 ÷ 504 = 19 times and 300 Remainder.

37. Divide 892152555 by 15
38. Divide 951629392 by 16
39. Divide 1070583066 by 18
40. Divide 1427444088 by 24
41. Divide 1605874599 by 27
42. Divide 3211749198 by 54
43. Divide 4817623797 by 81
44. Divide 4282332264 by 72
45. Divide 2141166132 by 36
46. Divide 3806517568 by 64
47. Divide 2498027154 by 42
48. Divide 5709776352 by 96
49. Divide 3330702872 by 56
50. Divide 16578728849529 by 21
51. Divide 24691358027450 by 25
52. Divide 29058259361280 by 32
53. Divide 27722046155100 by 33
54. Divide 33623862740380 by 44
55. Divide 23077472200272 by 48
56. Divide 53604297161690 by 55
57. Divide 30609790098492 by 66
58. Divide 63710916157476 by 84
59. Divide 46810513091144 by 88
60. Divide 91550785397688 by 108
61. Divide 47312487387264 by 132
62. Divide 140204993320368 by 144

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* *The answers to these 62* sums will be found in the corresponding *exercises, Simple Multiplication*, 578469, &c.

Case 3.—When the Divisor contains several figures proceed thus.

Divisor. Dividend. Quotient.
123)456789(3713
123 × 3 = 369 *Subtract.*
877 *Difference.*
123 × 7 = 861 *Subtract.*
168 *Difference.*
123 × 1 = 123 *Subtract.*
459 *Difference.*
123 × 3 = 369 *Subtract.*
90 *Remainder.*

3713 *Quotient.*
123 *Divisor.*
11139 = 3 times
7426 = 20 times
3713 = 100 times
90 = Rem.
456789 *Proof.*

63. Divide 987654 by 29
64. Divide .... by 31
65. Divide .... by 34
66. Divide .... by 37
67. Divide .... by 39
68. Divide .... by 41
69. Divide .... by 43
70. Divide .... by 46
71. Divide .... by 47
72. Divide .... by 49
73. Divide .... by 51
74. Divide .... by 53
75. Divide .... by 57
76. Divide .... by 59
77. Divide .... by 61
78. Divide 847653 by 271
79. Divide .... by 293
80. Divide .... by 354
81. Divide .... by 396
82. Divide .... by 432
83. Divide .... by 498
84. Divide .... by 527
85. Divide .... by 596
86. Divide .... by 634
87. Divide .... by 689
88. Divide .... by 735
89. Divide .... by 783
90. Divide .... by 847
91. Divide .... by 888
92. Divide .... by 999

93. Divide 2287195443194 by 4897634782 Ans. 467.
94. Divide 3740138295452 by 5428357468 Ans. 689.
95. Divide 1910839467835 by 4837568273 Ans. 395
96. Divide 4381267895955 by 7463829465 Ans. 587
97. Divide 258141390453 by 53478639 Ans. 4827.
98. Divide 743073285890 by 79345786 Ans. 9365.
99. Divide 226997479816 by 48576392 Ans. 4673.
100. Divide 785033604040 by 92837465 Ans. 8456.
101. Divide 314782218936 by 54763782 Ans. 5748.
102. Divide 659394786231 by 73486547 Ans. 8973.

103. Divide 277983886608 by 487632 Ans. 570069.
104. Divide 355266876580 by 583294 Ans. 609070.
105. Divide 519312257466 by 947638 Ans. 548007.
106. Divide 355556638401 by 756489 Ans. 470009.
107. Divide 450884386516 by 549386 Ans. 820706.
108. Divide 43042778240 by 60704 Ans. 709060.
109. Divide 427208700042 by 480006 Ans. 890007.
110. Divide 4867236000 by 6507 Ans. 748000.

Case 4.—*When there are ciphers annexed to the divisor*

Rule.—Cut them off, also cut off as many figures from the dividend, but annex them to the remainder at last.

111. 84376529 ÷ 40
112. .... ÷ 60
113. .... ÷ 70
114. .... ÷ 80
115. .... ÷ 90
116. .... ÷ 100
117. .... ÷ 110
118. .... ÷ 120
119. 9182736453 ÷ 600
120. 8724563274 ÷ 1800
121. 5637894683 ÷ 5000
122. 3294673856 ÷ 24000
123. 7416834769 ÷ 120000
124. 8274697483 ÷ 1600000
125. 9463574862 ÷ 4000000
126. 7386493785 ÷ 8000000

127. A farmer sows two bushels of wheat to the acre; how many acres will a thousand bushels sow ?
Ans. 500.

128. The colossus of Rhodes weighed 720000 ℔., Avoirdupois, and was sold A. D. 667 by the Saracens as old brass to a Jew, who loaded 900 camels with it; how much did each camel on an average carry ?
Ans. 800 ℔.

129. I have one sixty-fourth part of a ship which is worth £3200; what is the value of my share ?
Ans. £50.

130. Divide one million and a half by one thousand and a half. Ans. 1000.

131. The moon is 240 thousand miles from the earth; how many days would a horse take in galloping to the moon, providing he went 100 miles every 24 hours.
Ans. 2400.

132. What proportion does the population of Goole *2468 persons*, bear to Yorkshire containing 1591860 *inhabitants* ? Ans. 645.

133. A father left £13284 to be equally divided among 5 sons and 4 daughters; how much had each ?
Ans. £1476.

134. The dividend of a division sum is 555555, the remainder is 55, and the quotient is 125; what is the divisor ?
Ans. 4444.

135. The rays of light come from the sun to the earth in 8 minutes; at what rate does light move per minute, the sun being 95 millions of miles distant from the earth ?
Ans. 11875000 miles.

136. At what rate per hour are the inhabitants at the equator carried, the earth's diurnal motion being 24912 miles in 24 hours ?
Ans. 1038 miles.

137. Divide a dozen dozen, by half a dozen dozen ?
Ans. 2.

138. A farmer planted a million potatoes in half a thousand equal rows, how many did he set in each row ?
Ans. 2000.

139. If a reservoir holds half a million gallons of water; how long will it take to discharge it, at the rate of a quarter of a thousand gallons an hour at each of its four sides ?
Ans. 500 hours.

140. If a steam-vessel sails between Liverpool and New York 2808 miles in 13 days; how many miles is that per hour ?
Ans. 9.

141. A fruiterer distributed one half of 5000 apples among 25 boys, and the other half among 50 girls; what was each boy's, and each girl's share ?
Ans. Each boy 100; each girl 50.

142. The number of separate bones in the human frae is about 248, what proportion do the 8 bones in the skull, which form a vault and protect the brain, bear to the whole ?
Ans. 31.

143. The human heart contracts 4000 times in an hour, each ventricle, at least, contains one ounce of blood, therefore 350 pounds pass through the heart every hour, how often does the whole mass of blood, which is about 25 pounds, pass through the heart in one hour ?
Ans. 14.

144. In a man of ordinary height and bulk, there are 2500 square inches, 7000000 pores, and 1750000

inches of perspiratory tubes; divide each of the two last numbers by the first Ans. 28000; 700.

SUPPLEMENTAL EXERCISES.

1. The number of sailing vessels in Great Britain, A. D. 1845, under 50 tons was 8514, above 50 tons 44195 with a tonnage of 2955397, besides these there were 912 steamers; out of these 534 sailing vessels and 5 steamers were wrecked; what number remained? Ans. 53082.

2. The number of electors (1846) in England is 468258, in Wales 37092, and in Scotland 48082; how many non-electors are there in Great Britain the population being 18536567? Ans. 17973135

3. According to the official documents of France the number of registered electors is 238251; how many non-electors are there to one elector, the population amounting to 34069893? Ans. 142.

4. The Duke of Bridgewater's canal is 29 miles in length, the Grand Junction canal 90, the Grand Trunk canal 92, the Leeds and Liverpool canal 129, the Forth and Clyde canal 35, the Caledonian 60½, the Royal canal of Languedoc 152; now much does the sum of these canals fall short in length of the Imperial canal in China, which employed 30000 men 43 years, its length being 825 miles? Ans. 237½ miles.

5. The daily number of letters for delivery within the borough of Manchester averages 20000, the weekly number of newspapers 18000; what is the yearly number of each? Ans. 7300000 letters, 936000 newspapers.

6. The population of London, A. D. 1377, was 35000, Bristol 9000, Plymouth 7000, Norwich 6000, Newcastle 4000, Oxford 3500, the total population of England was estimated at 2300000; how many inhabitants did the remaining part of England contain in that remote age? Ans. 2235500.

7. London is supplied with water by 8 companies; the daily supply of the whole amounts to 36000000 gallons and distributed among 250000 houses; what is the average per house? Ans. 144 gallons.

8. Rome was supplied from 9 aqueducts with 500000

hogsheads of water every 24 hours; how much flowed from each aqueduct per minute? Ans. $38\frac{47}{81}$ hogsheads

9. The net annual revenues of the Church of England were A. D. 1834, bishoprics £160114, cathedral and collegiate churches £272828, benefices with cure of souls £3058248, sinecure benefices £17050; the amount is required? Ans. £3508240.

10. The number of dissenting congregations in England and Wales, A. D. 1829, were 7904; how much money will be required to pay the ministers thereof, each averaging £120 per annum? Ans. £948480.

11. The annual receipts of the foreign missionary societies, A. D. 1843, were the Church £115100, Wesleyan £98253, Baptist £51631, Jewish £4474, London £78450, Moravian £5324, United Secession £5784, Gospel Propagation £71308; what is the sum?

Ans. £430324.

12. The number of schools in England A. D. 1821, was 4167 with an endowment of £300525, containing 165433 scholars; unendowed 14282 with 478849 scholars; sunday schools 5162, with 452817 scholars; in Wales the number of schools was 209 with an endowment of £5817, containing 7625 scholars; unendowed 572, with 22976 scholars; sunday schools 301, with 24409 scholars; the number of scholars A. D. 1846, in England and Wales attending daily schools is estimated at 1936898, and sunday schools at 2384629; how many more scholars in 1846 than in 1821?

Ans. 1262015 daily scholars, 1907403 sunday scholars.

13. In the United Kingdom the cultivated land is calculated at 46522970 acres, uncultivated, but fit for cultivation 15000000, unprofitable for cultivation 15871463; in England and Wales the extent of land in wheat is said to be 3800000 acres, barley and rye 1000000, oats and beans 3000000, rye grass and clover 1200000, cabbages and roots (fields) 1200000, fallow 2300000, hop grounds 134000, nursery grounds 9000, orchards and gardens 41000, pleasure grounds 16000, lands depastured by cattle 17000000, hedge rows, copses, and woods 1000000, roads and water 1300000, commons and waste lands, 5094000; how many acres do Scotland and Ireland contain? Ans. 40300433

14. First Lord of the Treasury receives a salary of £5000; Lord High Chancellor (exclusive of his salary as speaker of the House of Lords,) £10000; Chancellor of the Exchequer, £5000; Home Secretary, £5000; Foreign Secretary £5000; Colonial Secretary, £5000; Secretary at War, £2480; First Lord of the Admiralty, £4500; President of the Council, £2000 Lord Privy Seal, £2000; Chief Commissioner of Woods and Forests, £2000; President of the Board of Trade, £2000; Postmaster General, £2500; President of the Board of Control, £3500; four junior Lords of the Treasury, each £1200; two joint Secretaries to the Treasury, each £2500; under Secretaries Home Department, £2000; under Secretaries Foreign Department, £2000; under Secretaries Colonial Department, £2000; five junior Lords of the Admiralty, each £1000; First Secretary, £2000; two Secretaries of the Board of Control, each £1500; Vice President of the Board of Trade, £2000; Master of the Mint, £2000; Paymaster General of the Forces, £2400; Judge—Advocate—General, £2000; Ordnance—Master General, £3000; Surveyor General, £1200; Secretary to the Board, £1400; Clerk, £1200; Store Keeper, £1200. Ireland—Lord Lieutenant, £20000; Lord High Chancellor, £8000! Chief Secretary, £5500. Household—Lord Chamberlain, £2000; Lord Steward, £2000; Master of the Horse, £2000; Master of the Buckhounds, £1700; Master of the Household, £1158; Vice Chamberlain, £924; Treasurer of the Household, £904; Comptroller of the Household, £904; Chief Equerry, and Clerk Marshal, £1000; four Equerries in Ordinary, each £750; Mistress of the Robes, £500; eight Ladies of the Bedchamber, each £500; eight Maids of Honour, each £400; eight Lords in Waiting, each £702; eight Grooms in Waiting; each £535 per annum; the amount is required? Ans. £164866.

15. How much did her Majesty Queen Elizabeth receive yearly from the crown lands in the manor of Milton; arable 276 acres, at $\frac{2}{3}$ of a £ per acre, meadow 39 acres at £1 per acre, pasture 80 acres, at $\frac{3}{4}$ of a £ per acre, other lands 80 acres, at $\frac{1}{2}$ of £ per acre, and other benefits belonging to the same manor to the amount of £161? Ans. £484.

COMPOUND ADDITION.

Teaches to add sundry sums together, having divers denominations, as in Money, Weights, Measures, &c.

£	s.	d.
73	14	6¾
81	19	9½
94	17	8¼
250	12	0½

Rule.—Place pounds under pounds, shillings under shillings, pence under pence, farthings under farthings, &c. Draw a line under them. Begin at the lowest denomination ; thus 1 farthing and 2 farthings make 3 farthings, 3 and 3 make 6. 6 farthings are 1½d. Put the ½ under the farthings, and add the 1 penny to the pence column. 1 penny and 8 pence make 9 and 9 make 18 and 6 make 24. 24 pence are 2 shillings. Put 0 under the pence column and add the 2 shillings to the shilling column, 2 shillings and 7 make 9 and 9 make 18 and 4 make 22 and 10 (of the 17) make 32 and 10 (of the 19) make 42 and 10 (of the 14) make 52. 52 shillings are 2 pounds 12 shillings. Set down the 12 shillings under the shilling column, and carry the 2 pounds to the pound column, and proceed as in Simple Addition.

Proof.—As in Simple Addition.

EXERCISES.

	£	s.	d.		£	s.	d.		£	s.	d.
(1)	4	8	6	(2)	38	14	7¼	(3)	73	17	10½
	2	7	9		46	17	5½		68	15	4¼
	8	6	4		73	14	8¾		45	12	7½
	*9	3	7		*54	16	3¾		*79	16	8½
	4	10	5		50	4	3½		15	1	0¼
	7	12	3		53	2	6½		31	4	7¾
	1	13	8		26	5	3¼		54	7	4½

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* The answers to these 192 sums will be found by subtracting as many ones as there are figures in the highest denomination of the fourth line, observing to prefix a 3 before the first figure, and by subtracting one from each of the lower denominations ; thus, £38 2 6 ; £343 15 2½ ; £368 15 7¼ will be the answers for the first three sums.

	£	s.	d.		£	s.	d.		£	s.	d.
(4)	56	14	9¾	(5)	87	14	5½	(6)	56	12	9½
	74	16	6½		54	16	7¼		73	14	7¼
	58	11	7¼		79	13	4¾		69	13	6¾
	63	19	10¾		99	19	11¾		87	17	10¾
	32	4	1		1	4	5¼		32	6	1¼
	25	3	5½		45	3	4¾		26	5	4¾
	41	8	4¾		20	6	7¼		30	6	5½

	£	s.	d.		£	s.	d.		£	s.	d.
(7)	48	15	6¾	(8)	72	13	11¼	(9)	46	13	5½
	76	14	5½		86	17	10½		73	15	4¾
	83	17	9¼		58	15	9¾		67	12	7½
	99	12	7¾		87	16	11½		83	9	4½
	40	3	4		27	6	0¾		42	5	5¼
	23	5	6½		2	1	0¼		26	4	7¼
	16	2	2¾		41	4	2¼		32	7	4¾

	£	s.	d.		£	s.	d.		£	s.	d.
(10)	75	9	4½	(11)	57	14	6¼	(12)	46	15	8¾
	46	8	3¼		78	15	8¾		72	11	9½
	69	5	8¾		46	13	5½		64	13	7¼
	73	16	9½		94	19	11¾		89	18	10½
	13	9	6¼		31	4	4½		42	3	2
	53	11	8¾		21	4	3¼		27	8	2½
	30	14	3¼		53	6	6½		35	6	4¾

	£	s.	d.		£	s.	d.		£	s.	d.
(13)	473	16	2½	(14)	574	14	3½	(15)	384	15	7½
	587	13	6¼		657	15	8¼		576	13	4½
	796	11	8¾		783	13	7¾		837	11	11¾
	987	19	11¾		694	17	11¾		978	18	10½
	4 5	2	8¼		3 4	4	7¼		504	3	3¼
	412	6	5¾		342	4	3¾		423	6	7½
	203	8	3¼		216	6	4¼		162	8	0¼

	£	s.	d.		£	s.	d.		£	s.	d.
(16)	764	16	5½	(17)	786	13	4¼	(18)	847	14	5½
	573	15	4¾		537	11	11½		573	13	6¼
	286	13	11¼		648	15	10¾		294	16	11½
	698	16	10¾		926	16	9½		786	19	10¾
	124	2	5¼		102	5	6½		41	4	5¼
	426	4	7½		462	8	0½		426	6	5¾
	713	6	0¾		351	4	1¼		705	3	0½

	£	s.	d.		£	s.	d.		£	s.	d.
(19)	463	2	4¼	(20)	574	14	4½	(21)	734	14	3¼
	574	1	3¾		386	15	7¼		876	13	6½
	846	6	8½		493	13	8¾		547	12	7¾
	785	12	7½		928	16	11½		794	16	11¼
	425	16	6½		314	4	6¼		154	4	7½
	425	18	8¼		613	4	4¾		123	6	5½
	153	13	3½		506	6	3¼		452	7	4¼

	£	s.	d.		£	s.	d.		£	s.	d.
(22)	648	15	10¼	(23)	745	13	5½	(24)	987	16	5¾
	759	13	9½		863	11	4¼		432	11	9½
	846	12	7¾		574	12	6¼		876	15	4¼
	937	16	11¾		947	18	11½		968	11	11¾
	240	3	0½		143	5	5¼		12	3	6¼
	240	6	2½		136	8	7¾		456	7	1¼
	153	7	4¼		425	7	5¼		123	4	7¾

	£	s.	d.		£	s.	d.		£	s.	d.
(25)	764	15	11½	(26)	548	19	8½	(27)	746	14	6¾
	457	13	10¼		376	16	7¼		578	13	8½
	638	11	9¾		859	13	5¾		386	17	4¼
	746	15	8½		746	16	9¾		796	19	9½
	235	4	0½		340	0	2¼		142	4	4
	431	5	0½		623	2	4¾		421	6	3½
	361	8	2¼		140	6	6¼		613	2	7¾

	£	s.	d.		£	s.	d.		£	s.	d.
(28)	583	13	9½	(29)	568	14	8¾	(30)	746	13	4½
	748	17	11¼		786	13	6½		574	18	11¼
	869	18	10¾		569	17	10¼		896	16	10¾
	987	19	11½		687	15	11¾		765	14	11¾
	305	5	1¼		320	4	2		142	5	6¼
	251	2	0¾		213	6	5½		425	1	0¾
	130	1	1¼		430	2	1¾		103	3	1¼

	£	s.	d.		£	s.	d.		£	s.	d.
(31)	532	4	6½	(32)	674	7	8¾	(33)	423	4	3½
	274	3	5¼		463	5	7½		634	5	1¾
	451	5	4¾		376	2	3¼		782	6	5¼
	674	11	10¾		537	4	8¼		576	7	9¼
	356	14	4¾		214	11	2		465	14	7¼
	725	16	6¾		536	14	4¼		365	14	10¼
	548	14	7½		623	17	8¼		217	13	6¼

	£	s.	d.		£	s.	d.		£	s.	d.
(34)	856	17	9¼	(35)	475	13	7½	(36)	564	10	7½
	763	16	8½		564	12	6¼		735	4	6¾
	857	16	7¾		782	15	4¾		496	13	2¼
	987	19	11¾		487	11	5¼		879	6	8¾
	632	1	1½		13	5	3¼		324	8	3¼
	236	8	3½		435	7	5¾		264	15	5¼
	142	4	4¼		217	4	7¼		503	6	9¾

37. Add £427 6s. 8½d. £789 14s. 6¼d. £574 15s. 4¾d. £782 13s. 7½d. £461 12s. 2¼d. £210 5s. 5¾d. and £425 4s. 7¼d. into one sum.

38. Add £765 15 4¾ £897 14 7½ £654 18 6¾ £973 15 8½. £123 3 6. £102 5 4½. and £345 1 5¼. into one sum.

39. Add £836 2 3¼. £245 1 2½. £126 3 4¾. £453 4 2¼. £52 16 7½. £754 18 9½. and £873 16 7¼d. together.

40. Add £472 14 6¾. £287 13 8¼. £549 11 4¾. £678 14 7½. £416 4 4. £712 6 3¾. and £450 8 7¼. together.

41. £537 14 6¾. + £768 13 9½. + £476 11 8¼. + £683 18 9¾. + £351 4 4. + £231 6 2½. + £523 8 3¾.

42. £436 3 6¾. + £687 2 7½. + £594 5 4¾. + £765 14 3½. + £452 15 4. + £312 17 4½. + £405 14 7¼.

43. £584 16 8¼. + £673 15 9½. + £867 13 11¾ + £234 15 6¾. + £304 2 2½. + £326 4 2½. + £132 6 0¼.

44. A grocer went to Liverpool and laid out on tea £426 2 3¼; on sugar £374 4 6½; on cheese £289 5 4¾; on treacle £123 4 5½; on coffee £462 16 7½; on currants £625 15 5½; on soap £710 14 7¼; how much did he lay out in all?

45. A manufacturer sends goods to New York to the amount of £764 14 6½; to Dublin, £573 11 7¾; to Belfast, £689 13 8¼; to Edinburgh, £987 16 5½; to *Glasgow,* £124 4 4¼; to London, £426 8 4¼; to *Hamburgh, £310 6* 3¾; what is the amount of the *whole?*

46. A country squire has seven farms; he lets one to A for £784 16 8¾; another to B for £597 14 7½; another to C for £684 18 9¼; another to D for £876 15 4¾; another to E for £104 2 2; another to F for £402 5 4½; and the remaining one to G for £315 1 2¾; what is the gentleman's annual income ?

47. A linen-draper bought prints at Manchester to the amount of £47 13 6½; shawls at Paisley, £36 18 9¼; gloves at Worcester, £52 15 8¾; carpets at Wilton, £67 18 9¾; crapes at Norwich, £41 5 4¼; ribbons at Coventry, £63 1 2¼; and stockings at Tewkesbury, £47 4 3¼; what sum of money did he lay out ?

48. In repairing my house the bricklayer's bill was £76 11 4¼; the mason's, £87 4 8½; the plasterer's, £78 15 7¾; the carpenter's, £98 17 6¾; the slater's, £12 7 6½; the painter's, £12 15 3½; and other sundry bills to the amount of £21 4 4¼; what did my house cost repairing ?

49. A gentleman's christmas bills were as follow : his landlord's, £57 14 6¼; his grocer's, £68 13 4½; his butcher's, £59 15 8¾; his baker's, £54 13 2¼; his coal-merchant's, £31 4 4½; his tailor's, £31 6 7½; and other small bills to the amount of £40 4 3¼; what was his annual expenditure ?

50. My servant returning from market found he had expended on beef £5 2 7¼; on mutton and veal £3 7 6½; on flour £4 8 9¼; on tea, coffee, and sugar £2 4 5½; on bacon and eggs £3 16 3½; on wearing apparel £6 12 5½; on coals £5 11 2¼; how much did he lay out in all ?

TROY WEIGHT.

(51) *oz.*	*dwt.*	*grs.*	(52) *oz.*	*dwt.*	*grs.*	(53) *oz.*	*dwt.*	*grs.*
67	19	23	54	10	12	76	13	17
56	17	19	76	13	16	53	11	13
48	13	15	84	16	23	48	18	18
65	14	13	76	15	14	98	17	16
32	0	1	34	8	11	12	5	6
32	1	4	23	6	8	46	8	11
51	6	9	15	3	1	51	1	5

(54) *oz.*	*dwt.*	*grs.*	(55) *oz.*	*dwt.*	*grs.*	(56) *lb.*	*oz.*	*dwt.*
81	13	15	71	10	12	74	6	10
68	11	18	56	5	6	57	8	16
47	17	16	68	14	17	73	11	17
43	12	11	87	16	15	54	10	12
7	5	8	17	8	11	14	4	9
31	8	6	43	14	18	42	3	4
52	2	8	31	5	7	26	0	3

(57) *oz.*	*dwt.*	*gr.*	(58) *lb.*	*oz.*	*dwt.*	(59) *oz.*	*dwt.*	*gr.*
62	10	12	84	6	10	45	13	6
57	13	23	78	5	14	63	15	17
65	19	7	46	11	8	38	11	12
43	12	11	74	8	17	78	9	4
26	8	11	4	4	9	43	5	17
42	6	1	21	6	6	36	4	7
34	0	17	53	0	12	61	8	12

(60) *lb.*	*oz.*	*dwt.*	(61) *oz.*	*dwt*	*gr.*	(62) *lb.*	*oz.*	*dwt.*
32	9	17	64	14	21	57	9	16
47	4	6	56	9	7	86	8	11
36	5	8	48	13	19	75	6	9
73	4	9	84	15	23	94	7	8
56	1	2	24	4	2	31	1	3
52	7	14	43	10	17	13	3	9
63	6	12	51	6	5	24	5	11

63. Add 56 oz. 17 dwt. 21 gr.; 84 oz. 13 dwt. 19 gr.; 65 oz. 11 dwt. 8 gr.; 76 oz. 15 dwt. 14 gr.; 32 oz. 1 dwt. 2 gr.; 15 oz. 6 dwt. 5 gr.; and 34 oz. 8 dwt. 16 gr.; into one sum.

64. Add 83 ℔. 9 oz. 11 dwt. 15 gr.; 75 ℔. 4 oz. 6 dwt. 14 gr.; 56 ℔. 3 oz. 7 dwt. 13 gr.; 65 ℔. 4 oz. 13 dwt. 12 gr.; 5 ℔. 1 oz. 7 dwt. 8 gr.; 24 ℔. 7 oz. 13 dwt. 10 gr.; and 43 ℔. 8 oz. 12 dwt. 11 gr. together.

65. 47 oz. 13 dwt. 16 gr. + 54 oz. 12 dwt. 13 gr. + 76 oz. 18 dwt. 23 gr. + 94 oz. 16 dwt. 15 gr. + 41 oz. 5 dwt. 7 gr. + 45 oz. 7 dwt. 11 gr. + 23 oz. 1 dwt. 1 gr.

66. 63 ℔. 9 oz. 17 dwt. 16 gr. + 52 ℔. 8 oz. 16 dwt. 17 gr. + 41 ℔. 7 oz. 15 dwt. 18 gr. + 97 ℔. 5 oz. 3 dwt. 19 gr. + 25 ℔. 1 oz. 1 dwt. 7 gr. + 47 ℔. 3 oz. 3 dwt. 7 gr. + 58 ℔. 4 oz. 4 dwt. 6 gr.

67. *The mint-master* received into the mint the following *gold-bullions*; on Monday one weighing 74 oz.

17 dwt. 16 gr.; on Tuesday, 65 oz. 12 dwt. 13 gr.; on Wednesday, 49 oz. 11 dwt. 14 gr.; on Thursday, 56 oz. 17 dwt. 18 gr.; on Friday, 14 oz. 1 dwt. 7 gr.; on Saturday in the morning, 34 oz. 7 dwt. 11 gr. and in the afternoon, 50 oz. 8 dwt. 10 gr.; the weight of the whole is required.

68. A gentleman's service of plate consists of a silver tea-pot, weighing 2 ℔. 9 oz. 16 dwt. 12 gr.; a coffee-pot weighing 3 ℔. 4 oz. 13 dwt. 18 gr.; 50 spoons, weighing 6 ℔. 2 oz. 12 dwt. 16 gr.; 20 plates, weighing 8 ℔. 6 oz. 11 dwt. 18 gr.; 12 knives and forks, weighing 6 ℔. 1 oz. 2 dwt. 11 gr.; 2 mugs, weighing 6 ℔. 7 oz. 6 dwt. 6 gr.; and 2 candlesticks, weighing 3 ℔. 9 oz. 7 dwt. 8 gr.; what is the weight of the whole?

APOTHECARIES' WEIGHT.

(69)	*dr.*	*sc.*	*gr.*
	5	2	18
	6	1	14
	3	2	11
	7	2	19
	4	0	2
	2	0	5
	6	0	9

(70)	*dr.*	*sc.*	*gr.*
	6	1	14
	5	1	11
	4	1	17
	7	2	12
	2	0	5
	4	1	9
	5	1	3

(71)	*dr.*	*sc.*	*gr.*
	5	0	16
	4	1	19
	6	0	15
	7	2	12
	3	1	3
	5	1	1
	3	2	5

(72)	*dr.*	*sc.*	*gr.*
	4	1	13
	5	0	17
	6	1	12
	4	2	15
	4	0	6
	4	2	3
	3	1	8

(73)	*oz.*	*dr.*	*sc.*
	4	6	2
	6	4	1
	7	7	2
	8	4	2
	4	0	0
	3	3	2
	2	0	1

(74)	*dr.*	*sc.*	*gr.*
	7	1	18
	4	0	14
	5	1	12
	6	2	19
	1	0	1
	5	2	6
	4	1	8

(75)	*oz.*	*dr.*	*sc.*
	6	6	1
	4	5	2
	7	4	1
	8	7	2
	2	0	1
	5	2	1
	2	3	2

(76)	*dr.*	*sc.*	*gr.*
	6	1	17
	7	2	14
	4	0	13
	6	2	11
	2	0	2
	2	0	6
	5	2	7

(77)	*lb.*	*oz.*	*dr.*
	73	10	6
	57	9	7
	85	6	2
	68	7	6
	15	0	1
	42	2	1
	14	5	6

(78) *lb.*	*oz.*	*dr.*	(79) *lb.*	*oz.*	*dr.*	(80) *lb.*	*oz.*	*dr.*
54	9	7	64	5	4	82	9	6
62	11	4	78	10	6	73	4	5
85	8	7	97	9	7	69	7	4
98	7	6	86	5	4	58	9	7
34	1	0	24	5	3	6	1	1
37	0	4	21	1	2	26	7	3
14	3	1	2	2	1	30	4	4

81. Add 74 ℔. 10 oz. 6 dr. 1 sc. 18 gr.; 86 ℔. 5 oz. 4 dr. 14 gr.; 97 ℔. 6 oz. 5 dr. 1 sc. 16 gr.; 83 ℔. 4 oz. 6 dr. 2 sc. 19 gr.; 14 ℔. 1 gr.; 13 ℔. 6 oz. 3 dr. 2 sc. 6 gr.; and 2 lb. 5 oz. 2 dr. 1 sc. 4 gr.; into one sum.

82. Add 64 lb. 7 oz. 3 dr. 1 sc. 14 gr.; 86 lb. 5 oz. 7 dr. 2 sc. 16 gr.; 72 lb. 9 oz. 4 dr. 1 sc. 17 gr.; 76 lb. 5 oz. 4 dr. 2 sc. 11 gr.; 24 lb. 3 oz. 3dr. 5 gr.; 13 lb. 6 oz. 4 gr.; and 27 lb 2 oz. 3 dr. 1 sc. 3 gr. together.

83. 54 lb. 10 oz. 6 dr. 1 sc. 18 gr. + 67 lb. 8 oz. 4 dr. 2 sc. 16 gr. + 83 lb. 4 oz. 3 dr. 1 sc. 19 gr. + 64 lb. 6 oz. 4 dr. 2 sc. 15 gr. + 34 lb. 1 gr. + 32 lb. 3 oz 3 dr. 4 gr. + 16 lb. 7 oz. 4 dr. 1 sc. 1 gr.

84. 67 lb. 9 oz. 4 dr. 0 sc, 16 gr. + 83 lb. 4 oz. 5 dr. 1 sc. 14 gr. + 72 lb. 3 oz. 6 dr. 2 sc. 15 gr. + 64 lb. 2 oz. 5 dr. 2 sc. 13 gr. + 21 lb. 1 oz. 2 dr. 1 sc. 3 gr. + 16 lb. 7 oz. 2 dr. 1 sc. 6 gr. + 27 lb. 8 oz. 1 dr. 5 gr.

85. An apothecary compounded in one day the following drugs; Peruvian bark, 7 oz. 4 dr. 1 sc. 14 gr.; oil of almonds, 4 oz. 6 dr. 2 sc. 16 gr.; calomel, 6 oz. 3 dr, 1 sc. 11 gr.; Epsom salts, 4 oz. 5 dr. 2 sc. 9 gr.; hiera picra, 1 oz. 2 dr. 5 gr.; ipecacuanha, 5 oz. 1 dr. 4 gr.; and magnesia, 3 oz. 4 dr. 1 sc. 9 gr.; what was the weight of the whole.

86. An apothecary sent to the Greenwich Hospital the following powders; antimonial, 4 oz. 6 dr. 1 sc. 16 gr.; basilic, 6 oz. 3 dr. 18 gr.; canella alba, 7 oz. 2 dr. 2 sc. 15 gr.; cascarilla, 5 oz. 7 dr. 2 sc. 19 gr.; colombo, 4 oz. 3 gr.; rhubarb, 3 oz. 4 dr. 2 sc. 2 gr.; *and sarsaparilla,* 2 oz. 5 dr. 5 gr.; the whole weight is *required.*

AVOIRDUPOIS WEIGHT.

(87) *lb.*	*oz.*	*dr.*	(88) *lb.*	*oz.*	*dr.*	(89) *lb.*	*oz.*	*dr.*
46	12	11	54	11	9	67	14	13
74	13	12	36	7	8	58	12	9
65	9	8	48	12	11	73	9	12
87	6	5	76	15	14	54	13	12
42	2	4	34	3	6	21	0	2
25	2	4	63	8	8	41	3	7
34	6	8	51	3	5	26	6	4

(90) *lb.*	*oz.*	*dr.*	(91) *qr.*	*lb.*	*oz..*	(92) *qr.*	*lb.*	*oz.*
84	13	10	74	26	14	65	17	12
79	8	6	63	15	11	47	26	14
65	10	12	87	22	13	73	12	9
78	9	6	63	19	15	89	14	7
4	1	5	14	0	1	23	9	3
20	7	10	36	12	5	52	1	2
34	5	4	12	5	3	26	15	7

(93) *qr.*	*lb.*	*oz.*	(94) *qr.*	*lb.*	*oz.*	(95) *cwt.*	*qr.*	*lb.*
68	12	13	82	22	12	62	1	25
47	9	4	57	14	9	76	2	23
84	26	10	86	26	7	84	1	19
74	23	15	65	14	11	78	2	16
20	14	2	6	4	3	26	1	2
52	18	12	42	13	7	23	1	5
15	1	6	13	1	9	15	2	9

(96) *cwt.*	*qr.*	*lb.*	(97 *ton.*	*cwt.*	*qr.*	(98) *ton.*	*cwt.*	*qr.*
73	2	14	78	18	2	65	17	1
54	1	19	83	16	1	47	12	2
37	2	16	57	12	3	38	10	3
58	3	27	64	19	3	74	12	3
15	0	13	10	0	1	23	1	2
45	2	9	16	3	3	52	7	2
62	1	12	42	7	1	61	9	1

99. Add 78 lb. 14 oz. 12 dr; 69 lb. 11 oz. 9 dr.; 76 lb. 13 oz, 11 dr.; 83 lb. 15 oz., 14 dr.; 10 lb. 3 dr.; 30 lb. 4 oz. 7 dr.; and 23 lb. 2 oz. 5 dr. into one sum.

100. Add 86 qr. 26 lb. 14 oz.; 65 qr. 15 lb. 10 oz.; 74 qr. 21 lb. 13 oz.; 69 qr. 22 lb. 12 oz.; 2 qr. 11 oz.; 34 qr. 12 lb. 6 oz.; and 25 qr. 6 lb. 3 oz.; together.

101. 76 tons 16 cwt. 1 qr. 24 lb. 14 oz. + 58 tons 12 cwt. 2 qr. 14 lb. 10 oz. + 69 tons 18 cwt. 3 qr. 25 lb. 13 oz. + 78 tons 19 cwt. 3 qr. 27 lb. 15 oz. + 12 tons 2 cwt. 1 qr. 2 lb. 1 oz. + 41 tons 7 cwt. 1 qr. 13 lb 6 oz. + 30 tons 1 cwt, 2 lb. 3 oz.

102. 47 tons 16 cwt. 1 qr. 22 lb. 10 oz. + 64 tons 15 cwt. 2 qr. 18 lb. 12 oz. + 89 tons 19 cwt. 1 qr. 24 lb. 9 oz. + 78 tons 16 cwt. 2 qr. 19 lb. 7 oz. + 41 tons 2 cwt. 1 qr. 4 lb. 5 oz. + 35 tons 4 cwt. 1 qr. 9 lb. 4 oz. + 10 tons 2 qr. 3 lb. 7 oz.

103. A sugar-refiner purchased sugars at the following ports; at Liverpool, 64 cwt. 2 qr. 16 lb. Havannah; at London, 67 cwt. 3 qr. 24 lb. Bengal; at Hull, 49 cwt. 1 qr. 22 lb. Mauritius; at Goole, 65 cwt. 2 qr. 24lb. clayed Manilla; at Leith, 24 cwt. 11 lb. Muscovado; at Greenock, 42 cwt. 4 lb. Java; at Dublin, 50 cwt. 2 qr. 6 lb. Madras; what was the amount of the whole?

104. A coffee-roaster bought 7 bags of coffee; No. 1 weighed 67 cwt. 1 qr. 14 lb. Jamaica; No. 2. 28 cwt 2 qr. 16 lb. Laguira; No. 3, 36 cwt. 3 qr. 22 lb. Costa Rica; No. 4; 57 cwt. 1 qr. 18 lb. black Triage; No. 5, 21 cwt. 1 qr. 13 lb. Maracaibo; No. 6, 71 cwt. 1 qr. 12 lb. Mocha; No. 7, 63 cwt. 6 lb. Sincapore; what was the weight of the whole?

CLOTH MEASURE.

(105) *fl.e.*	*qr.*	*n.*	(106) *fl.e.*	*qr.*	*n.*	(107) *fl.e.*	*qr.*	*n*
76	1	2	43	1	1	68	1	2
69	2	1	65	2	2	47	2	3
87	1	2	78	1	2	59	1	2
65	2	3	83	2	3	63	2	3
12	0	1	45	0	2	20	0	1
30	0	3	34	0	2	52	0	1
12	1	2	21	1	2	40	1	2

(108) *fl e.*	*qr.*	*n.*	(109) *yd.*	*qr.*	*n.*	(110) *yd.*	*qr.*	*n.*
54	1	1	73	1	2	64	2	1
63	2	3	86	2	1	58	3	2
56	1	2	57	1	2	79	2	3
74	2	3	64	2	3	64	3	3
34	0	2	15	1	1	24	0	2
36	0	1	13	1	3	41	0	2
43	1	2	42	2	2	20	1	1

(111) *yd*	*qr.*	*n*	(112) *yd.*	*qr.*	*n*	(113) *e. e.*	*qr.*	*n.*
72	2	3	53	3	1	78	2	3
64	3	1	78	2	3	56	3	1
57	2	3	59	1	2	79	1	2
49	3	3	68	3	3	86	4	3
16	0	0	35	0	2	10	1	0
35	0	3	21	0	1	43	1	3
42	1	1	40	2	2	20	3	2

(114) *e. e.*	*qr.*	*n.*	(115) *fr.e.*	*qr.*	*n*	(116) *fr.e.*	*qr.*	*n.*
64	1	2	54	4	2	48	4	3
58	3	1	78	5	3	59	5	2
79	4	3	69	3	2	67	4	3
69	4	3	79	5	3	76	5	3
24	2	1	34	0	1	40	0	0
41	1	3	21	0	1	40	0	2
20	0	1	30	2	2	32	1	1

117. Add 867 yd. 1 qr. 3 n.; 573 yd. 2 qr. 1 n.; 685 yd. 2 qr. 3 n.; 876 yd 3 qr. 2 n.; 426 yd. 1 qr. 3 n.; 21 yd. 1 qr.; and 314 yd. 1 qr. 1 n. into one sum.

118. Add 526 yd. 2 qr. 1 n.; 685 yd. 1 qr. 3 n.; 538 yd. 2 qr. 2 n.; 647 yd. 3 qr. 3 n.; 362 yd. 2 n.; 314 yd. 2 qr. 1 n.; and 461 yd. 1 qr. 2n. together.

119. 578 yd. 1 qr. 2 n. + 769 yd. 3 qr. 3 n. + 482 yd. 2 qr. 2 n. + 857 yd. 3 qr. 3 n. + 310 yd. 1 qr. 1 n. + 230 yd. 1 n. + 517 yd. 1 qr. 2 n.

120. 823 yd. 2 qr. 1 n. + 746 yd. 3 qr. 3 n. + 674 yd. 2 qr. 2 n. + 985 yd. 3 qr. 3 n. + 65 yd. 2 n. +253 yd. 1 n. + 325 yd. 1 qr. 2 n.

121. A clothier sold 7 pieces of woollen cloth; in the first there were 674 yd. 2 qr. 1 n.; in the second, 583 yd. 3 qr. 2 n.; in the third, as many as in the first; in the

fourth, 486 yd. 3 qr. 2 n.; in the fifth, 214 yd. 2 n.; in the sixth, 416 yd. 2 n.; in the seventh, 325 yd. 1 qr. 3 n.; how much in the whole?

122. A tailor bought 374 yd. 1 qr. 2 n. of black cloth; 486 yd. 2 qr. 1 n. of blue; 694 yd. 3 qr. 3 n. of olive; 573 yd. 3 qr. 3 n. of green; 514 yd. 1 qr. 1 n. of drab; 513 yd. 1 qr. 3 n. of brown; and 305 yd. 1 n. of mixture; how many yards did he buy?

LINEAL OR LONG MEASURE.

(123)

ft.	*in.*	*b.c.*
87	10	2
46	9	1
79	7	1
68	11	2
1	0	0
53	2	2
20	4	2

(124)

yd.	*ft.*	*in.*
74	2	10
68	1	9
59	2	7
67	2	11
25	0	2
20	0	2
40	0	5

(125)

fath.	*ft.*	*in.*
79	4	10
46	5	9
58	3	7
76	5	11
20	0	1
42	0	3
41	2	5

(126)

fur.	*p.*	*yd.*
84	36	1
76	28	3
54	39	4
74	24	2
4	2	3½
23	11	2½
45	0	1½

(127)

m.	*fur.*	*p.*
74	6	36
69	4	31
85	2	37
64	7	35
14	0	3
30	3	9
14	5	3

(128)

m.	*fur.*	*p.*
57	3	28
69	2	27
93	6	39
78	7	39
31	3	11
30	5	13
6	1	1

(129)

m.	*fur.*	*p.*
64	4	18
58	7	39
73	6	16
84	7	39
24	2	21
41	0	1
26	1	24

(130)

m.	*fur.*	*p.*
53	6	37
68	4	29
79	5	34
54	7	39
35	0	2
31	3	11
20	2	6

(131)

l.	*m.*	*fur.*
72	1	6
69	2	4
83	1	5
98	2	7
16	0	1
30	0	4
16	1	3

(132)

l.	*m.*	*fur.*
87	1	5
65	2	4
93	1	6
74	2	7
1	0	2
34	0	4
6	1	2

(133)

m.	*yd.*	*ft.*
64	1758	2
27	1741	1
86	1759	2
94	1728	2
24	0	0
72	18	2
13	0	1

(134)

m.	*yd.*	*ft.*
84	2	1
95	4	2
68	6	1
98	1759	2
4	1756	1
4	1755	1
31	1753	2

135. 86 yd. 1 ft. 9 in.; 79 yd. 2 ft. 6 in.; 84 yd. 1 ft. 10 in.; 52 yd. 2 ft. 11 in.; 2 yd. 2 in.; 20 yd. 6 in.; and 15 yd. 1 ft. 2 in. into one sum.

136. 348 m. 1758 yd. 2 ft. + 796 m. 2 yd. 1 ft. + 867 m. 1756 yd. 2 ft. + 689 m. 4 yd. 1 ft. + 540 m. + 203 m. 1757 yd. 2 ft. + 132 m. 3 yd. 1 ft.

137. A person performed the following feats within twenty-four hours; he sailed 72 m. 1740 yd.; he rode on horseback 63 m. 4 yd.; he travelled by railway the same distance he sailed; he rode in a coach the same distance as on horseback; he walked 27 m. 20 yd.; he ran 25 m. 1755 yd.; and he went in a balloon the same distance he walked; what was the distance of the whole?

138 Seven persons left London at the same time; one went to Brighton, 49 m. 6 fur. 36 p.; another to Dover, 71 m. 4 fur. 28 p.; another to Gravesend, 21 m. 1 fur. 2 p.; another to Windsor, 21 m. 2 fur. 6 p.: another to Southend, 50 m. 1 fur. 4 p.; another to Watford, 17 m. 2 fur. 11 p.; and the other to Margate, 78 m. 6 fur. 38 p.; the amount of these distances is required.

MEASURE OF CAPACITY.

(139) *qr.*	*b.*	*p.*
71	6	2
68	4	1
57	3	2
98	7	3
17	0	1
31	3	3
42	4	2

(140) *qr.*	*b.*	*p.*
67	5	2
84	3	1
69	6	3
74	7	3
21	1	1
15	4	3
40	1	1

(141) *qr.*	*b.*	*p.*
58	2	1
64	3	2
79	4	3
67	6	3
30	4	2
35	4	2
20	3	1

(142) *qr.*	*b.*	*p.*
65	4	2
74	3	1
69	5	2
86	5	3
23	2	1
25	4	3
30	2	2

(143) *gal.*	*qt.*	*pt.*
67	2	1
58	3	1
79	2	1
83	3	1
21	0	0
41	0	1
20	1	1

(144) *gal.*	*qt.*	*pt*
74	1	1
86	2	1
59	3	1
74	3	1
14	1	0
13	1	1
40	0	1

(145) *gal.*	*qt.*	*pt.*
68	1	1
53	3	1
72	2	1
87	3	1
20	1	0
46	0	1
27	1	1

(146) *gal.*	*qt.*	*pt.*
57	2	1
68	3	1
79	2	1
65	3	1
31	0	0
31	0	1
20	1	1

(147) *b.*	*p.*	*gal*
76	2	1
54	3	1
68	2	1
54	3	1
12	0	0
45	0	1
31	1	1

(148) *b.*	*p.*	*gal.*
83	2	1
75	1	1
62	2	1
43	2	1
5	0	0
24	2	1
37	1	1

(149) *qr.*	*b.*	*p.*
83	6	2
74	5	1
57	3	3
98	7	3
5	0	1
25	2	3
42	4	1

(150) *qr.*	*b.*	*p.*
57	4	2
68	6	1
83	3	2
54	3	1
31	2	1
31	1	3
16	4	2

151. Add 67 gal. 1 qt. 1 pt.; 58 gal. 2 qts. 1 pint; 76 gal. 3 qt. 1 pt.; 84 gal. 3 qt. 1 pint; 21 gal. 1 qt.; 41 gal 1 qt. 1 pt.; and 23 gal. 1 pt. into one sum.

152. Add 74 qr. 6 b. 2 p.; 58 qr. 7 b, 3 p.; 89 qr. 4 b. 1 p.; 65 qr. 4 b 1 p.; 14 qr. 1 p.; 41 qr. 1 p; and 10 qr. 3 b. 3 p. together.

153. 68 gal. 2 qt. 1 pt.+57 gal. 1 qt. 1 pt.+89 gal. 2 qt. 1 pt.+76 gal. 3 qt. 1 pt.+20 gal.+42 gal. 2 qt. 1 pt.+10 gal. 1 qt. 1 pt.

154. 82 qr. 6 b. 2 p. + 76 qr. 7 b. 3 p. + 54 qr. 6 b. 1 p. + 87 qr. 6 b. 3 p. + 6 qr. 1 p. + 23 qr. 1 p. + 45 qr. 1 b. 3 p.

155. A wine merchant imported 867 gal. 2 qt. 1 pt. of claret; 584 gal. 3 qt. 1 pt. of port; 693 gal. 2 qt. 1 pt. of sherry; 876 gal. 3 qt. 1 pt. of Lisbon; 21 gal. of Bucellas; 415 gal 1 pt. Madeira; and 306 gal. 1 qt. 1 pt. of Vidonia; how much did he import in all?

156. A corn-factor sold 376 qr. 6 b. 3 p. of white wheat, 489 qr. 7 b. 2 p. of red wheat; 548 qr. 6 b. 1 p. of white *oats;* 678 qr. 7 b. 3 p. of black oats; 512 qr of barley; *510 qr. 2 p. of peas;* and 451 qr. 1 b. 3 p. of beans; how *much did he sell in all ?*

TIME.

(157) h.	m.	s.	(158) d.	h.	m.	(159) d.	h.	m.
78	58	56	54	21	58	72	19	47
49	37	59	39	23	47	58	21	29
83	29	37	68	19	39	64	22	58
98	57	56	87	16	55	76	15	54
10	0	3	34	1	1	16	3	12
50	22	1	60	0	13	41	2	31
16	30	23	31	4	21	35	1	2

(160) d.	h.	m.	(161) w.	d.	h.	(162) w.	d.	h.
63	21	54	52	5	21	74	4	22
74	19	45	68	6	19	68	6	15
86	23	58	74	3	17	59	6	23
65	14	53	87	6	23	76	5	23
25	1	5	36	0	2	14	1	1
25	4	15	31	0	5	31	0	9
13	0	2	25	3	7	40	0	1

(163) w.	d.	h.	(164) w.	d.	h.	(165) m.	w.	d.
47	3	19	57	5	22	87	2	5
58	6	21	84	3	19	54	3	4
74	5	22	75	6	2	69	1	3
65	4	23	54	3	22	54	3	6
41	2	4	31	0	1	1	0	1
41	0	3	15	3	5	45	0	3
25	1	2	24	0	22	30	2	4

(166) m.	w.	d.	(167) m.	w.	d.	(168) m.	w.	d.
57	2	5	64	2	4	58	1	5
65	3	4	58	1	6	69	2	4
78	2	6	69	2	5	47	1	6
43	2	1	48	3	6	54	2	4
31	0	1	24	0	2	30	1	1
34	0	3	41	2	1	30	1	3
21	1	1	30	1	2	52	2	1

169. Add 56 yr. 9 m. 2 w.; 73 yr. 4 m. 1 w.; 85 yr. 11 m. 3 w.; 98 yr. 12 m. 3 w.; 32 yr. 2 m. 1 w.; 26 yr. 8 m. 3 w.; and 14 yr. 1 m. 1 w.; into one sum.

170. Add 64 yr. 8 m. 3 w.; 59 yr. 11 m. 2 w.; 68 yr. 12 m. 1 w.; 76 yr. 12 m. 3 w.; 24 yr. 3 m.; 40 yr. 1 m. 2 w.; and 31 yr. 3 w.; together.

171. 67 yr. 11 m. 2 w. 5 d. 23 h. + 48 yr. 9 m. 1 w. 4 d. 19 h. + 59 yr. 12 m. 3 w. 6 d. 23 h. + 98 yr. 12 m. 3w. 6 d. 23 h. + 21 yr. + 51 yr. 3 m. 2 w. 2 d. 5 h. + 40 yr. 1 h.

172. 86 yr. 9 m. 0 w. 3 d. 20 h. 56 m. 57 s. + 97 yr. 9 m. 1 w. 3 d. 19 h. 54 m. 47 s. + 78 yr. 12 m. 3 w. 6 d. 23 h. 59 m. 59 s. + 67 yr. 12 m. 3 w. 6 d. 23 h. 59 m. 59 s. + 2 yr. + 2 yr. 3 m. 2 w. 3d. 4 h. 5 m. 13 s. + 21 yr. 2m. 2 w. 2 d. 2 h. 2 m. 3 s.

173. In cultivating a piece of ground it took the woodcutters 57 w. 4 d. 19 h.; the fencers 64 w. 2 d. 21 h. the ditchers 59 w. 5 d. 23 h.; the drainers 73 w. 1d. 21 h.; the ploughmen 31 w. 1 d. 4h.; the harrowers 35 w. 4 d. 3 h.; and the weeders 40 w. 1 d. 1 h.; how long were the different workmen engaged?

174. Tom was 47 m. 2 w. 4 d. old when his brother John was born; John was 58 m. 3 w. 6 d. old, when his sister Sarah was born; Sarah was 76 m. 1 w. 5 d. old, when her brother James was born; James was 48 m. 2 w. 6 d, old, when his sister Eliza was born; Eliza was 41 m. 2 d, old, when her brother Samuel was born; Samuel was 41 m. 1d. old when his sister Mary was born; how old was Tom when Mary was 23 m. 2 w. 2 d. old?

SQUARE OR LAND MEASURE.

(175) *yd.*	*ft.*	*in.*	(176) *yd.*	*ft.*	*in.*	(177) *yd.*	*ft.*	*in.*
78	6	142	67	5	4	64	5	138
37	4	6	49	7	143	93	7	5
58	7	141	58	3	8	48	6	141
65	8	143	64	7	143	54	7	143
10	1	1	21	2	139	24	2	5
62	4	138	50	1	1	6	1	139
41	1	3	41	5	136	51	2	3

(178)	*yd.*	*ft.*	*in.*	(179)	*a.*	*r.*	*p.*	(180)	*a.*	*r.*	*p.*
	56	6	28		57	2	38		84	2	36
	78	4	46		65	1	29		76	1	28
	79	5	72		47	2	36		45	3	24
	84	6	96		54	3	39		78	3	39
	32	1	115		31	0	1		4	0	3
	21	4	98		34	2	11		23	2	12
	20	3	72		52	1	4		54	0	16

(181)	*a.*	*r.*	*p.*	(182)	*a.*	*r.*	*p.*	(183)	*a.*	*r.*	*p.*
	63	1	24		74	2	29		54	1	26
	59	2	28		58	1	36		65	2	28
	68	3	34		69	3	27		47	1	19
	49	3	38		45	3	39		34	2	27
	25	1	15		14	0	10		34	1	13
	40	1	12		41	2	4		34	1	12
	31	0	6		30	0	13		52	2	21

(184)	*a.*	*r.*	*p.*	(185)	*a.*	*r.*	*p.*	(186)	*a.*	*r.*	*p.*
	73	2	28		57	1	16		64	2	21
	48	1	34		82	2	18		58	1	37
	57	2	29		74	3	19		89	2	21
	68	3	39		56	2	14		72	1	31
	15	0	11		31	1	23		24	0	18
	51	2	6		17	1	22		41	2	3
	42	1	11		25	0	21		10	1	19

187. Add 72 a. 1 r.; 13 p.; 54 a. 2 r. 18 p; 67 a. 1 r. 24 p.; 46 a. 2r. 34 p.; 16 a. 1 r. 26 p.; 45 a. 1 r. 22 p.; and 32 a. 2 r. 16 p. into one sum.

188. Add 63 a. 2 r. 4 p.; 27 a. 1 r. 6 p.; 54 a. 2 r. 8 p. 67 a. 1 r. 3 p.; 25 a. 35 p.; 72 a 2 r. 34 p.; and 45 a. 1 r. 32 p. together.

189. 64 a. 2 r. 31 p. + 48 a. 1 r. 34 p. + 56 a. 2 r. 27 p + 74 a. 3 r. 18 p. + 24 a. 8 p. + 51 a. 2 r. 6 p. + 43 a. 1 r. 13 p.

190. 56 a. 1 r. 26 p. + 68 a. 2 r. 24 p. + 43 a. 1 r. 17 p. + 74 a. 3 r. 34 p. + 32 a. 1 r. 13 p. + 31 a. 1 r. 16 p. + 56 a. 2 r. 23 p.

191. A farmer occupies seven fields; the first contains 46 a. 2 r. 36 p.; the second, 67 a. 1 r. 24 p.; the third,

58 a. 3 r. 18 p.; the fourth, 49 a. 3 r. 39 p.; the fifth, 42 a. 3 p.; the sixth, 32 a. 2 r. 16 p.; and the seventh, 41 a. 22 p.; how much in all ?

192 A farmer had 42 a. 1 r. 14 p. in wheat; 54 a. 3 r. 12 p. in oats; 67 a. 2 r. 26 p. in rye; 48 a. 1 r. 28 p. in barley; 46 a, 1 r. 25 p. in potatoes, 45 a. 28 p. in grass; and 32 a. 1 r. 14 p. in fallow, what is the extent of his farm?

COMPOUND SUBTRACTION

Teaches to find the difference between any two sums of divers denominations, as Money, Weights, and Measures, &c.

		20	12
	£	s.	d.
From	47	14	8¼
Take	28	16	9¾
Rem.	18	17	10½
Proof	47	14	8¼

Rule.—Place the less number under the greater, each denomination standing under the same denomination, and draw a line under them. Then say 3 farthings from 1 farthing, cannot; borrow 1 from the next higher denomination which is pence, 1 penny = 4 farthings added to the 1 make 5 farthings. 3 from 5 and 2 farthings remain, put the 2 farthings down under the farthings. Carry 1 penny which was borrowed to 9 pence, make 10. 10 from 8, cannot; borrow 1 shilling = 12 pence added to the 8 make 20 pence. 10 from 20 and 10 pence remain, put down the 10 pence under the pence. Carry 1 shilling which was borrowed to the 16 shillings make 17 shillings. 17 from 14, cannot; borrow 1 pound = 20 shillings added to the 14 make 34 shillings. 17 from 34 and 17 remain, put the 17 shillings under the shillings. Carry 1 pound which was borrowed to the 8 pounds and proceed as in Simple Subtraction.

Proof.—As in Simple Subtraction.

EXERCISES.

(1) £	s.	d.	(2) £	s.	d.	(3) £	s.	d.
*10	6	3	*60	12	3¾	*100	0	0
5	17	9	21	17	8½	26	2	1½

* *The answers to these 192 sums will be found in the first line of the corresponding* exercises, Compound Addition. £4. 8s. 6d. &c.

(4)	£	s.	d.	(5)	£	s.	d.	(6)	£	s.	d.
	84	8	4¼		124	3	10¼		70	7	4¾
	27	13	6½		36	9	4¾		13	14	7¼

(7)	£	s.	d.	(8)	£	s.	d.	(9)	£	s.	d.
	64	8	4¼		100	19	4		75	10	9¾
	15	12	9½		28	5	4¼		28	17	4¼

(10)	£	s.	d.	(11)	£	s.	d.	(12)	£	s.	d.
	114	3	10¾		107	11	1¾		81	12	2
	38	14	6¼		49	16	7¼		34	16	5¼

(13)	£	s.	d.	(14)	£	s.	d.	(15)	£	s.	d.
	802	10	9¾		961	6	8¼		649	19	3¼
	328	14	7¼		386	12	4¾		265	3	8¼

(16)	£	s.	d.	(17)	£	s.	d.	(18)	£	s.	d.
	1051	9	9¾		1266	10	1		1412	10	1¼
	286	13	4½		479	16	8¾		564	15	7¾

(19)	£.	s.	d.	(20)	£.	s.	d.	(21)	£.	s.	d.
	737	9	0½		1260	13	7¾		1021	11	11½
	274	6	8¼		685	19	3½		286	17	8¼

(22)	£	s.	d.	(23)	£	s.	d.	(24)	£	s.	d.
	1001	9	2¾		1232	5	9¾		1483	19	11½
	352	13	4½		486	12	4¼		496	3	5¾

(25)	£.	s.	d.	(26)	£	s.	d.	(27)	£	s.	d.
	1110	10	8¼		916	14	3¼		1234	10	2
	345	14	8¾		367	14	6¾		487	15	7¼

(28)	£	s.	d.	(29)	£	s.	d.	(30)	£	s.	d.
	863	10	5¾		946	7	11		1644	7	10¾
	279	16	8½		376	13	2¼		897	14	6¼

(31)	£	s.	d.	(32)	£.	s.	d.	(33)	£	s.	d.
	1506	11	3¼		1000	0	0		999	12	9¾
	974	6	8¾		325	12	3¼		576	8	6¼

(34)	£	s.	d	(35)	£	s.	d.	(36)	£	s.	d.
	624	12	5¾		1160	6	1¾		854	3	11¾
	267	14	8½		684	12	6¼		289	13	4¼

37. From £1212 5s. 3¾d. take £784 18s. 7¼d.
38. From £888 18s. 8½d. take £123 3s. 3¾d.
39. Take £163 7s. 5¾d. from £999 9s. 9d.
40. Take £305 3s. 0¼d. from £777 17s. 7d.
41. £1401 18s. 2d.—£864 3s. 7¼d.
42. £1070 9s. 10½d.—£634 6s. 3¾d.
43. £1446 19s. 5¾d.—£862 2s. 9½d.

44. How much less is £624 13s. 8½d.; than £1050 15s. 11¾d.

45. Two persons owe £1232 10s. 10¾d.; A's debt is £467 16s. 4¼d; how much does B owe ?

49. A field and its present produce are worth £1660 10s. 4¼d: the wheat growing thereon is worth £425 6s. 4¼d; the barley, £250 7s. 3¼d; the potatoes, £115 6s 8d.; and the beans, £84 13s. 4d; what is the value of the field ?

47. A person owes £100: when he has paid £52 6s. 5½d; how much will he be indebted?

48. A tradesman borrowed £176 11s. 4d; he paid on Lady-day £24 6s. 8d; on Midsummer-day, £25 13s 4d.; on Michaelmas-day, £28 16s. 7½d; and on Christmas-day, £21 3s. 4¼d; how much remains unpaid ?

48. A waggon and two horses are worth £96 2s. 2¾d.; the waggon is worth, £38 7s. 8½d; can you tell me the value of the two horses?

50. A young person had £6 3s. 8½d. in his purse; he owed one pound, one shilling, one penny, and one farthing; how much money had he after he had paid his debt ?

TROY WEIGHT.

(51)	*oz.*	*dwt.*	*gr.*	(52)	*oz.*	*dwt.*	*gr.*	(53)	*oz.*	*dwt.*	*gr.*
	116	16	13		104	4	4		160	5	11
	48	16	14		49	13	16		83	11	18

(54)	*oz.*	*dwt.*	*gr.*	(55)	*oz.*	*dwt.*	*gr.*	(56)	*lb.*	*oz.*	*dwt.*
	148	16	7		130	4	2		168	3	7
	67	*2*	*16*		58	13	14		93	8	17

(57)	*oz.*	*dwt.*	*gr.*	(58)	*lb.*	*oz.*	*dwt.*	(59)	*oz.*	*dwt.*	*gr.*
	137	7	6		178	2	6		124	13	1
	74	16	18		93	7	16		78	19	19

(60)	*lb.*	*oz.*	*dwt.*	(61)	*oz.*	*dwt.*	*gr.*	(62)	*lb.*	*oz.*	*dwt.*
	97	5	15		93	12	5		96	7	12
	64	7	18		28	17	8		38	9	16

63. From 141 oz. 14 dwt. 16 gr., take 84 oz. 16 dwt. 19 gr.

64. Take 64 lb. 7 oz. 17 dwt. 7 gr. from 148 lb. 5oz. 8 dwt. 22 gr.

65. 106 oz. 10 dwt. 14 gr.—58 oz. 16 dwt. 22 gr.

66. 127 lb. 7 oz 15 dwt. 8 gr.—63 lb. 9 oz. 17 dwt. 16 gr.

67. A silversmith bought 107 oz 14 dwt. 10 gr. of silver-plate; he sold on Monday 14 oz. 3 dwt. 6 gr.; on Tuesday, 7 oz. 16 dwt. 18 gr.; on Wednesday, 6 oz. 13 dwt. 21 gr.; on Thursday, 2 oz. 6 dwt. 3 gr.; on Friday, 1 oz. 16 dwt. 18 gr.; how much had he left for the Saturday's market?

68. A silver coffee-pot, weighing 4 lb. 5 oz. 11 dwt. 11 gr., and a silver tea-pot, weighing 1 lb. 7 oz. 14 dwt. 23 gr.; what is the difference in weight?

APOTHECARIES' WEIGHT.

(69)	*dr.*	*sc.*	*gr.*	(70)	*dr.*	*sc.*	*gr.*	(71)	*dr.*	*sc.*	*gr.*
	10	0	0		10	0	0		10	1	12
	4	0	2		3	1	6		5	0	16

(72)	*dr.*	*sc.*	*gr.*	(73)	*oz.*	*dr.*	*sc.*	(74)	*dr.*	*sc.*	*gr.*
	11	1	11		12	2	0		17	1	10
	6	2	18		7	3	1		9	2	12

(75)	*oz.*	*dr.*	*sc.*	(76)	*dr.*	*sc.*	*gr.*	(77)	*lb.*	*oz.*	*dr.*
	15	1	2		16	1	16		158	6	14
	8	3	1		9	2	19		84	12	8

(78)	*lb.*	*oz.*	*dr.*	(79)	*lb.*	*oz.*	*dr.*	(80)	*lb.*	*oz.*	*dr*
	109	2	14		144	2	12		157	4	1
	54	9	7		79	13	8		74	10	11

81. From 143 lb. 2 oz. 6 dr. 1 sc. 14 gr., take 68 lb. 3 oz. 7 dr. 2 sc. 16 gr

82. Take 98 lb. 2 oz. 6 dr. 2 sc. 18 gr. from 162 lb. 10 oz. 2 dr. 1 sc. 12 gr.

83. 100 lb.—45 lb. 1 oz. 1 dr. 1 sc. 2 gr.

84. 99 lb. 2 oz. 2 dr. 2 sc. 2 gr.—31 lb. 4 oz. 6 dr. 1 sc. 6 gr.

85. A surgeon sent 7 oz. 3 dr. 1 sc. 6 gr. of physic to his patients, out of a casket, weighing 15 oz.; what remains?

86. A druggist bought 11 oz. 1 dr. 1 sc. 1 gr. of paregoric elixir, he sold 6 oz. 2 dr. 2 sc. 5 gr., how much has he on hand?

AVOIRDUPOIS WEIGHT.

(87) *lb.*	*oz.*	*dr.*	(88) *lb.*	*oz.*	*dr.*	(39) *lb.*	*oz.*	*dr.*
88	8	8	99	9	9	96	0	7
41	11	13	44	14	0	28	1	10

(90) *lb*	*oz*	*dr.*	(91) *qr.*	*lb.*	*oz.*	(92) *qr.*	*lb.*	*oz.*
138	3	6	123	12	10	124	16	5
53	5	12	48	13	12	58	26	9

(93) *qr.*	*lb.*	*oz.*	(94) *qr.*	*lb.*	*oz.*	(95) *cwt.*	*qr.*	*lb.*
143	6	12	129	14	3	136	3	11
74	21	15	46	19	7	74	1	14

(96) *cwt.*	*qr.*	*lb.*	(97) *ton.*	*cwt.*	*qr.*	(98) *ton.*	*cwt.*	*qr.*
136	0	11	127	14	3	140	10	2
62	1	25	48	16	1	74	13	1

99. From 165 lb. 12 oz. 7 dr., take 86 lb. 13 oz. 11 dr.

100. Take 74 qr. 21 lb. 12 oz., from 161 qr. 20 lb. 10 oz.?

101. 131 tons 10 cwt. 3 qr. 12 lb. 10 oz.—54 tons 14 cwt. 1 qr. 15 lb. 12 oz.

102. 134 tons 16 cwt. 21 lb. 9 oz.—86 tons, 19 cwt. *2 qr. 26 lb. 15 oz.*

103. A wholesale grocer at Hull bought 164 cwt. 1 qr. 15 lb. of sugar; he sold to a country-grocer from the North, 26 cwt. 1qr. 14 lb.; to another from the West, 29 cwt. 2 qr. 13 lb.; to another from the South, 21 cwt. 2 qr. 26 lb.; to another from the East, 22 cwt. 2 lb.; a grocer at Leeds took the remainder; what weight had he?

104. The Peter bell at York weighs 11 tons, 19 cwt. 3 qr. 26 lb.; the Old Tom of Oxford weighs 7 tons 11 cwt. 3 qr. 4 lb.; the Tom of Lincoln, weighs 5 tons, 4 cwt. I qr. 16 lb.; the Peter at St. Paul's weighs 5 tons, 2 cwt. 1 qr. 22 lb,; the question is, what is the difference in weight between the sum of the two Peters, and the sum of the two Toms? Answer, 4 tons 6 cwt. 1 qr.

CLOTH MEASURE.

(105) *fl. e.*	*qr.*	*n.*	(106) *fl. e.*	*qr.*	*n.*	(107) *fl e.*	*qr.*	*n.*
145	1	1	70	0	3	117	1	1
68	2	3	26	2	2	48	2	3

(108) *fl.e.*	*qr.*	*n.*	(109) *yd.*	*qr.*	*n.*	(110) *yd.*	*qr.*	*n.*
122	1	0	130	0	1	100	0	0
67	2	3	56	2	3	35	1	3

(111) *yd.*	*qr.*	*n.*	(112) *yd.*	*qr.*	*n.*	(113) *e.e.*	*qr.*	*n.*
141	0	1	138	1	3	148	2	2
68	1	2	84	2	2	69	4	3

(114) *e.e.*	*qr.*	*n.*	(115) *fr. e.*	*qr.*	*n.*	(116) *fr. e.*	*qr.*	*n.*
102	4	1	93	4	1	125	4	1
38	2	3	38	5	3	76	5	2

117. From 1444 yd. 1 qr. 1 n. take 576 yd. 3 qr. 2 n.
118. Take 696 yd. 1 n. from 1222 yd. 2 qr. 2 n..
119. 1000 yd.—421 yd. 2 qr. 2 n.
120. 888 yd. 3 qr. 3 n.—65 yd. 1 qr. 2 n.

121. A clothier had 1000 yd. of black cloth; he sold by auction 115 yd. 1 qr. 3 n.; he sold by private contract 84 yd. 2 qr. 1 n.; he bartered for other goods with 125 *yd. 1 qr.* 3 n.; how much had he left?

122. A tailor purchased 485 yd. 2 qr. 3 n. of woollen cloth; he made into suits 27 yd. 2 qr. 3 n., for merchants; 51 yd. 1 qr. 1 n. for farmers; 32 yd. 1 qr. 1 n. for sailors; how much remained?

LINEAL OR LONG MEASURE.

(123) *f.t.*	*in.*	*b.c.*	(124) *yd.*	*ft.*	*in.*	(125) *fath.*	*ft.*	*in.*
155	7	1	143	1	7	166	4	9
67	8	2	68	1	9	86	5	11

(126) *fur.*	*p.*	*yd.*	(127) *m.*	*fur.*	*p.*	(128) *m.*	*fur.*	*p.*
152	24	4½	161	4	24	142	3	24
67	28	3½	86	5	25	84	7	36

(129) *m,*	*fur.*	*p.*	(130) *m.*	*fur.*	*p.*	(131) *l.*	*m.*	*fur.*
121	4	15	81	2	22	137	1	5
56	7	37	27	3	25	64	2	7

(132) *l.*	*m.*	*fur.*	(133) *m.*	*yd.*	*ft.*	(134) *m.*	*yd.*	*ft.*
152	1	4	121	1755	1	142	1744	2
64	2	7	56	1756	2	58	1742	1

135. From 156 yd. 1 ft. 8 in. take 69 yd. 2 ft. 11 in.

136. 825 m. 1739 yd. 1 ft.—476 m. 1740 yd. 2 ft.

137. A gentleman on Monday travelled by railway 376 m. 1758 yards; on Tuesday he sailed in a steam packet 124 m. 1749 yd.; on Wednesday he went in a mail coach 150 m. 1736 yd.; on Thursday he rode in a gig 99 m. 1727 yd.; on Friday he rode on horseback 106 m. 104 yd.; on Saturday he walked 67 m. 1746 yd; how much short of a thousand miles did he travel during the week?

138. Two travellers left Manchester, one of them walked 85 m. 6 fur. 36 p.; the other only 36 m.; how much did the first walk more than the second?

MEASURE OF CAPACITY.

(139) *qr.*	*b.*	*p.*	(140) *qr.*	*b.*	*p.*	(141) *qr.*	*b.*	*p.*
136	*3*	3	99	4	1	85	0	2
64	*5*	*1*	31	6	3	26	6	1

(142)	*qr.*	*b.*	*p.*
	92	1	3
	26	5	1

(143)	*gal.*	*qt.*	*pt.*
	92	0	1
	24	2	0

(144)	*gal.*	*qt.*	*pt.*
	133	0	0
	58	2	1

(145)	*gal.*	*qt.*	*pt.*
	100	0	0
	31	2	1

(146)	*gal.*	*qt.*	*pt.*
	99	3	1
	42	1	0

(147)	*b.*	*p.*	*gal.*
	88	3	1
	12	1	0

(148)	*b.*	*p.*	*gal.*
	151	1	2
	67	3	1

(149)	*qr.*	*b.*	*p.*
	151	6	1
	67	7	3

(150)	*qr.*	*b.*	*p.*
	147	4	1
	89	7	3

151. From 94 gal. 3 qt. 1 pt. take 27 gal. 2 qt.
152. Take 65 qr. 7 b. 3 p. from 140 qr. 6 b. 1 p.
153. 147 gal. 1 qt. 1 pt.—78 gal. 3 qt.
154. 156 qr. 4 b. 3 p.—73 qr. 6 b. 1 p.

155. A liquor-merchant bought 1000 gal. of Oporto wine: 50 gal. escaped out of a leaky pipe; 50 gal. were seized by the Custom-house officer; 32 gal. 1 qt. 1 pt. were embezzled by the sailors; how much did he receive safe?

156. How much does 999 qr. 7 b. 3 p., exceed 623 qr 1 bush.?

TIME.

(157)	*hr.*	*min.*	*sec.*
	143	20	34
	64	21	38

(158)	*dy.*	*hr.*	*min.*
	138	17	18
	83	19	20

(159)	*dy.*	*hr.*	*min*
	141	9	16
	68	13	29

(160)	*dy.*	*hr.*	*min.*
	148	17	32
	84	19	38

(161)	*w.*	*dy.*	*hr.*
	100	0	0
	47	1	3

(162)	*w.*	*dy.*	*hr.*
	99	4	4
	24	6	6

(163)	*w.*	*dy.*	*hr.*
	88	2	2
	40	5	7

(164)	*w.*	*dy.*	*hr.*
	77	6	6
	20	0	8

(165)	*mo.*	*w.*	*dy*
	99	2	2
	11	3	4

(166)	*mo.*	*w.*	*dy.*
	142	0	4
	84	1	6

(167)	*mo.*	*w.*	*dy.*
	144	0	3
	79	1	6

(168)	*mo.*	*w.*	*dy.*
	88	1	6
	29	3	5

169. From 124 yr. 8 m. 3 w., take 67 yr 12 m. 1 w.
170. Take 34 yr. 4 m. 1 w., from 99 yr.
171. 99 yr.—31 yr. 1 m. 1 w. 1 d. 1 h.
172. 100 yr.—13 yr. 3 m. 3 w. 3 d. 3 h. 3 m. 3 sec.

173. A traveller engaged for 100 weeks; in Yorkshire he spent 18 weeks, 3 days, 15 hours of his time; in Lancashire, 11 weeks, 3 days, 9 hours; in Lincolnshire, 9 weeks, 5 days, 11 hours; in Derbyshire, 2 weeks, 3 days, 8 hours; how long had he then to travel?

174. A young man, enlisted in the Queen's service for 21 years, has already accomplished 13 years, 13 months, 13 weeks, 13 days, 13 hours, 13 minutes, and 13 seconds of his engagement; how long has he to serve?

Ans. 6 yr. 9 m. 1 w. 10 h. 46 m. 47 sec.

SQUARE OR LAND MEASURE.

(175) *yd.*	*ft.*	*in.*	(176) *yd.*	*ft.*	*in.*	(177) *yd.*	*ft.*	*in.*
133	6	141	152	4	1	148	3	137
54	8	143	84	7	141	83	6	143

(178) *yd.*	*ft.*	*in.*	(179) *a.*	*r.*	*p.*	(180) *a.*	*r.*	*p.*
100	0	0	99	2	2	161	2	34
43	2	116	41	3	4	76	3	38

(181) *a.*	*r.*	*p.*	(182) *a.*	*r.*	*p.*	(183) *a.*	*r.*	*p.*
92	0	18	143	2	26	123	1	14
28	2	34	68	3	37	68	3	28

(184) *a.*	*r.*	*p.*	(185) *a.*	*r.*	*p.*	(186) *a.*	*r.*	*p.*
122	0	25	126	0	5	129	1	2
48	1	37	68	2	29	64	2	21

187. From 157 a. 1 p., take 84 a. 2 r. 28 p.
188. Take 48 a. 3 r. 38 p., from 112 a. 2 r. 2 p.
189. 123 a. 2 r. 10 p.—58 a. 3 r. 19 p.
190. 96 a. 1 r. 11 p.—39 a. 3 r. 25 p.

191. A person rents a farm containing 100 acres; he lets out to a butcher 20 a. 2 r. 32 p.; to a quarrymaster, 19 a. 1 r. 8 p.; to a brickmaker, 13 a. 1 r. 4 p.; what quantity of land does he retain?

192. A field containing 88 acres is sown with wheat and barley; 45 a. 2 r. 26 p. are sown with wheat; how much is sown with barley?

COMPOUND MULTIPLICATION

Teaches to find what any given number of different denominations will amount to, when it is repeated a number of times.

Rule.—Say 3 times 3 farthings are 9. 9 farthings are 2¼d. Set down ¾ and carry 2 to the pence; 3 times 7 make 21 and 2 carried make 23; 23 pence are 1s. 11d.; set down the 11d. and carry 1; 3 times 11 make 33 and 1 carried make 34; 34 shillings are £1. 14s. Set down the 14s. and carry 1; 3 times 8 make 24 and 1 carried make 25; set down 25 under the pounds.

£	s.	d.
8	11	7¾
		3
25	14	11¼

Proof.—By Division.

EXERCISES.

	£	s.	d.		£	s.	d.		£	s.	d.
*(1)	9	8	4¼	*(2)	12	4	3½	*(3)	16	12	7¾
			2				3				4
(4)	18	16	9¼	(5)	14	17	9¾	(6)	48	18	10½
			5				6				7
(7)	54	17	9¼	(8)	89	13	7½	(9)	78	13	8¼
			8				9				10
(10)	84	15	9½	(11)	69	19	11¾	(12)	83	15	7½
			11				12				9

* The answers to these 181 sums will be found in the corresponding exercises, Compound Division; thus, £18 16s. 8½d., &c.

13. Multiply £1 1s. 1¼d. by 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 continually.

14. Multiply £2 2s. 2½d. by 12, 11, 10, 9, 8, 7, 6, and 5 continually.

15.	£876	17s.	9¾d.	× 12	21.	£576	13s.	4¼d.	× 6
16.	...	...	...	× 9	22.	894	18	5¾	× 9
17.	...	...	...	× 11	23.	685	17	6½	× 10
18.	...	...	...	× 10	24.	748	12	9¾	× 12
19.	...	...	...	× 8	25.	987	11	4½	× 7
20.	...	...	...	× 7	26.	435	16	8¼	× 11

27. What cost 6 yards of cloth, at 18s. 9d. per yard?

28. What cost 12 pounds of tea, at 5s. 10d. per pound?

29. What cost 8 pounds of butter, at 11½d. per pound?

30. What cost 7 gallons of oil, at 1s. 10¾d. per gallon?

31. What cost 11 yards of muslin, at 2s. 7¼d. per yard?

32. What cost 9 lb. of beef, at 6¼d. per lb.?

Case 2.—When the multiplier exceeds 12, and the number is such that any two numbers being multiplied together will produce it.

Rule.—Multiply the given price by one of those numbers, and the product by the other, which will give the answer.

£	s.	d.	
4	3	7¼	
		4	× 4 = 16
16	14	5	= 4
		4	
66	17	8	= 16

33.	£746	8s.	9¾d.	× 16	43.	£834	7s.	8¼d.	× 35
34.	...	...	...	× 24	44.	692	14	11¾	× 36
35.	...	...	...	× 32	45.	985	16	9½	× 40
36.	...	...	...	× 44	46.	739	13	7¼	× 45
37.	...	...	...	× 56	47.	483	15	8½	× 48
38.	...	...	...	× 72	48.	396	12	10½	× 55
39.	...	...	...	× 84	49.	249	9	7¾	× 64
40.	...	...	...	× 96	50.	374	7	4¼	× 99
41.	...	...	...	× 100	51.	897	19	11¾	× 120
42.	...	...	...	× 108	52.	678	13	9½	× 144

53. What do 48 lb. of candles come to at 7½d. per lb. ?

54. A grocer bought 132 lb. of tea, for which he paid 4s. 3½d. per lb.; how much did he pay ?

55. What cost 100 stones of wool, at 13s. 9¾d. per st. ?

56. A farmer pays in rent £849 17s. 9¾d. annually; how much will his landlord receive in 21 years ?

57. A butcher bought 144 sheep; they cost him £1. 15s. 9¼d. each; how much did they come to ?

58. What is the value of 108 ounces of gold, at £3. 17s. 10½d. per oz. ?

Case 3.—When the multiplier cannot be produced by the multiplication of two numbers.

Rule.—Multiply as before by the numbers that come nearest to it, less; then multiply the top line by as many as are wanting, adding it to the last product.

£	s.	d.	
1	3	4½	
		4	× 4+1=17
4	13	6	=4
		4	
18	14	0	=16
1	3	4½	=1
19	17	4½	=17

59.	£849	19s.	11¾d.	×17	69.	£435	16s.	8½d.	× 76
60.	...	...	...	×23	70.	748	13	9¼	× 83
61.	...	...	...	×29	71.	568	11	4¾	× 91
62.	...	...	...	×37	72.	879	10	3¼	× 97
63.	...	...	...	×43	73.	974	12	5½	×101
64.	...	...	...	×47	74.	649	19	7½	×107
65.	...	...	...	×52	75.	724	15	8¾	×111
66.	...	...	...	×58	76.	486	13	7¼	×119
67.	...	...	...	×67	77.	857	18	6½	×123
68.	...	...	...	×71	78.	948	9	8¾	×139

79. Bought 1 cwt. of raisins for £1, 17s. 4d. I demand the value of 19 cwt.

80 If 1 ton of coals costs 9s. 9d., what will 39 tons cost ?

81. A gentleman spends per week, £3, 7s. 11½d.; how much does he spend in a year ?

82. Bought 106 oxen at 5 guineas each; what did the whole cost ?

83. A labourer receives 1s. 11½d. per day; what do his month's wages amount to in January ?

84. What will 1 cwt. of soap cost, at 5¼d. per lb. ?

Case 4.—When the multiplier is considerably great.

Rule.—Multiply as in the following example.

	£	*s.*	*d.*		
Multiply	4	8	6½	by	4567.
			10		
	44	5	5	=	10
			10		
	442	14	2	=	100
			10		
	4427	1	8	=	1000
			4		
	17708	6	8	=	4000
price of 100×5=	2213	10	10	=	500
price of 10 ×6=	265	12	6	=	60
top line×7=	30	19	9½	=	7
	20218	9	9½	=	4567

85.	£8	7s.	6½d.	× 365	93.	£48	7s.	6d.	× 237
86.	...	...	...	× 489	94.	24	3	9	× 474
87.	...	...	...	× 674	95.	16	2	6	× 711
88.	...	...	..	× 948	96.	12	1	10½	× 948
89.	...	...	...	×1276	97.	9	13	6	×1185
90.	...	...	...	×1489	98.	8	1	3	×1422
91.	...	...	...	×1865	99.	6	0	11¼	×1896
92.	...	...	...	×2473	100.	5	7	6	×2133

101. A person earns 2s. 3¼d. a-day; how much does he earn in a year ?

102. A bookbinder employs 17 men at 1s. 11¼d. a-day; 19 women at 11¾d. a-day; and 79 children at 7¼d. a-day; how much does he pay a-year to these persons ?

103. A corn-factor sold 9876 quarters of wheat at *£2, 8s. 9½d, per* qr.; what was the price of the whole ?

104. A gentleman bought an estate containing 6473 acres, for which he paid £34, 17s. 9½d. per acre; how much did he pay in all?

105. A person owes £24857, he agrees with his creditors to pay 6s. 8½d. in the pound; how much money must he possess to satisfy his creditors?

106. The population of Goole is 2468, suppose each person costs 7¾d. a-day in provisions; how much does the whole port cost a-year in the necessaries of life?

Case 5.—When the given quantity consists of ¼, ½, ¾, or any fractional part; as, ⅘.

If ¼, divide the price of one by 4.

If ½, divide the price of one by 2.

If ¾, divide the price of one by 2 and divide that quotient by 2, add them together.

	£	s.	d.	
¼ is ¼	1	4	6	
			2¼	
	2	9	0	=2
		6	1½	=¼
	2	15	1½	

If ⅘, multiply the price of one by the upper figure, and divide the product by the under figure.

107.	£28	16s.	4d.	× 6½	117.	£38	17s.	6½d.	× 58½
108.	...	...	...	× 8¼	118.	69	14	8	× 76¾
109.	...	...	...	×12¾	119.	84	16	9	× 59¼
110.	...	...	...	×16½	120.	63	11	4½	× 83½
111.	...	...	...	×18¼	121.	69	13	7	× 69¾
112.	...	...	...	×37¾	122.	73	19	9½	× 94⅘
113.	...	...	...	×49½	123.	85	15	7	× $108\frac{6}{7}$
114.	...	...	...	×54¼	124.	94	9	0¾	× $121\frac{8}{9}$
115.	...	...	...	×68¾	125.	78	4	0	×135⅚
116.	...	...	...	×74½	126.	98	16	0	×143⅞

OF WEIGHTS AND MEASURES.

	lb.	*oz.*	*dwt.*	*gr.*			*lb.*	*oz.*	*dr.*	*sc.*	*gr.*	
127.	84	11	17	23	× 6	133.	49	10	7	2	19	× 5
128.	...	...	...	...	× 8	134.	...	...	...	...	...	×12
129.	...	...	...	...	× 9	135.	..	...	...	...	...	× 9
130.	...	...	...	...	×11	136.	...	...	...	...	...	× 7
131.	...	...	...	...	× 7	137.	...	...	...	...	...	× 8
132.	...	...	...	..	× 4	138.	...	...	...	...	...	×10

	cwt.	*qr.*	*lb.*	*oz.*	*dr.*	
139.	73	3	27	15	14	× 4
140	...	...	...	...	...	× 7
141.	...	...	...	...	...	× 9
142.	...	...	...	...	...	×11
143.	...	...	...	...	...	×10
144.	...	...	...	...	...	× 6

	yd.	*qr.*	*n.*	
145.	874	3	2	× 8
146.	..	..	..	× 3
147.	..	..	..	× 5
148.	..	..	..	× 9
149.	..	..	..	×12
150.	..	..	..	× 7

	m.	*yd.*	*ft.*	*in.*	
151.	81	1759	2	11	× 3
152.	..	..	..	..	× 7
153.	..	..	..	..	× 9
154.	..	..	..	..	×11
155.	..	..	..	..	× 5
156.	..	..	..	..	× 4

	qr.	*b.*	*p.*	*gal.*	
157.	54	7	3	1	× 6
158.	..	..	..	..	×10
159.	..	..	..	..	×12
160.	..	..	..	..	× 8
161.	.	.	..	..	× 4
162.	..	..	..	..	× 9

	yr.	*m.*	*w.*	*dy.*	
163.	64	12	3	6	×12
164.	..	..	..	..	× 3
165.	..	..	..	..	×10
166.	..	..	..	..	× 4
167.	..	..	..	..	× 9
168.	..	..	..	..	× 7

	a.	*r.*	*p.*	
169.	847	3	36	× 5
170.	..	..	..	×11
171.	..	..	..	× 6
172.	..	..	..	× 8
173.	..	..	..	×12
174.	..	..	..	× 9

175. A sovereign weighs 5 dwt. 3¼ gr.; what is the weight of 1000 sovereigns ?

176. An imperial gallon of distilled water at the temprature of 62° of Fahrenheit's thermometer weighs 12 lb. 1 oz. 16 dwt. 16 gr.; what is the weight of 210 gallons ?

177. A peck-loaf weighs 17 lb. 6 oz. 1 dr. what weight of bread will a quarter of flour make ?

178. A cloth-merchant bought 39 pieces of superfine black cloth, each piece measuring 27 yd. 3 qr. 2 n.; 47 pieces of drab, each 36 yd. 2 qr. 1 n.; 58 pieces of olive, each 54 yd. 3 qr. 2 n.; and 76 pieces of mixture, each 29 yd. 1 qr. 3 n.; what quantity had he in all ?

179 What distance will a person walk in a year who goes every day 21 m. 1746 yd, ?

180. How much wine will 259 casks contain, each holding 137 gal. 3 qt. 1 pt. ?

181. A mean lunation is 29 d. 12. h. 44 m. 2¾ sec. ; *what length of time* passes over during 12 lunations ?

A WOOLLEN DRAPER'S BILL.

New-Street, Huddersfield, June 30th, 1846.

Mr. James Couper,

To John Hepworth. Dr.

1846.		£	s.	d.		£	s.	d.
Jan. 15..	To 12 yds. black cloth, at	1	4	6	℔ yd.			
Feb. 28..	To 18 .. kerseymere, at	0	8	4	....			
Mar 21..	To 24 .. scarlet cloth, at	0	19	6	....			
Apr. 7..	To 16 .. shalloon, at	0	2	8	....			
May 12..	To 20 .. drugget, at	0	1	7	....			
June 18..	To 28 .. serge, at	0	2	9	....			
						£ 53	3	4

A COAL-MERCHANT'S BILL.

Bondgate-Green, Ripon, December 31st, 1846.

Mr. Thomas Duckles,

To Samuel Ackroyd. Dr.

		s.	d.		£	s.	d.
July 16..	To 4 Tons Adair's Main, at	14	9	℔ ton			
Aug. 18..	To 16 .. Smith's Pontop, at	13	10	....			
Sep. 9..	To 21 .. Braddyl's Het. at	18	9	....			
Oct. 6..	To 15 .. Haswell. at	19	0	....			
Nov 5..	To 14 .. Nelson's W. H. at	16	6	....			
Dec 28..	To 18 .. West Wylam, at	15	6	....			
					£73	9	1

AN ACCOUNT OF DOMESTIC EXPENSES.

1846.	Received £	s.	d.	Paid. £	s.	d.
Jan. 1..On hand	1	8	4			
.. 6..Paid for Butter............					8	6
.... Tea					6	8
.... Sugar					10	4
..13..Received	5	0	0			
..14..Paid Corn-miller's Account .				2	4	6
..21...... Coal-merchant's do. ..				1	16	9
..31..On hand .... £	[illegible]	[illegible]	[illegible]			

COMPOUND DIVISION

Teaches to divide by one common divisor any given number of different denominations into any proposed number of equal parts.

Rule.—Proceed thus, 3 in 7 twice and 1 over, set down the 2 under the 7, and carry 1 pound which is 20 shillings to the 11; 11 and 20 are 31 shillings; then 3 in 31, 10 times and 1 over, set down the 10 and carry 1 shilling which is 12 pence to the 4; 4 and 12 are 16, then 3 in 16, 5 times and 1 over, set down the 5 and carry 1 penny which is 4 farthings to the halfpenny; 2 and 4 are 6 farthings; then 3 in 6 twice; set down ½.

Proof.—By Multiplication.

£ s. d.	*Case* 2. £ s. d.	*Case* 4. £ s. d.
3)7 11 4½	16 { 4 × 4	8 16 8	2½ 4 8 6¾
2 10 5½	2 4 2	2 2
3	0 11 0½	5) 8 17 1½
7 11 4½		1 [illegible]5 [illegible] ⅖

EXERCISES.

(1) £ s. d.	(2) £ s. d	(3) £ s. d.
2)18 16 8½ *	3)36 12 10½	4)6 10 7
(4) £ s. d.	(5) £ s. d.	(6) £ s. d.
6)94 3 10¼	6)89 6 10½	7)342 12 1½
(7) £ s. d.	(8) £ s. d.	(9) £ s. d.
8)439 2 2	9)807 2 7½	10)786 16 10½
(10) £ s. d.	(11) £ s. d.	(12) £ s. d.
11)932 13 8½	12)839 19 9	9)754 0 7¼

13. Divide £3829140. by 10, 9, 8, 7, 6, 5, 4, 3, and 2 continually.

14. Divide £42120540. by 5, 6, 7, 8, 9, 10, 11, and 12 continually.

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* *The answers to these 181 sums will be found in the corresponding exercises, Compound Multiplication; thus, £9 8s. 4¼d., &c.*

	£	s.	d.			£	s.	d.	
15..	10522	13	9	÷ 12	21..	3460	0	1½	÷ 6
16..	7892	0	3¾	÷ 9	22..	8054	6	3¾	÷ 9
17..	9645	15	11¼	÷ 11	23..	6858	15	5	÷ 10
18..	8768	18	1½	÷ 10	24..	8983	13	9	÷ 12
19..	7015	2	6	÷ 8	25..	6912	19	7½	÷ 7
20..	6138	4	8¼	÷ 7	26..	4794	3	6¾	÷ 11

27. If 6 stones of wool cost £5 12s. 6d., what cost 1 stone ?

28. Bought 12 pair of shoes for £3 10s., what did they cost per pair ?

29. Eight boys subscribed 7s. 8d. to relieve a poor person; how much did each subscribe ?

30. Divide 13s. 3¼d. equally among 7 boys ?

31. If a person spends £1 8s. 7¼d. in 11 days, what is that per day ?

32. A little boy had 4s. 8¼d. in his savings' box; how much did he save on an average each week, allowing this sum to have been the proceeds of 9 weeks ?

Case 2.—When the Divisor exceeds 12, and the number is such that any two numbers being multiplied together will produce it.

Rule.—Divide the given price by one of these numbers, and the product by the other, which will give the answer.

	£	s.	d.			£	s.	d.	
33..	11943	1	0	÷ 16	43..	29203	9	0¾	÷ 35
34..	17914	11	6	÷ 24	44..	24938	19	3	÷ 36
35..	23886	2	0	÷ 32	45..	39433	11	8	÷ 40
36..	32843	7	9	÷ 44	46..	33285	12	2¼	÷ 45
37..	41800	13	6	÷ 56	47..	23221	14	0	÷ 48
38..	53743	14	6	÷ 72	48..	21815	8	1½	÷ 55
39..	62701	0	3	÷ 84	49..	15966	17	4	÷ 64
40..	71658	6	0	÷ 96	50..	37062	8	0¾	÷ 99
41..	74641	1	3	÷ 100	51.	107759	17	6	÷ 120
42..	80615	11	9	÷ 108	52..	97731	6	0	÷ 144

53. Bought 48 pounds of cheese for £1 9s.; how much was that per lb. ?

54. What is the value of one book, when 11 dozen cost £28 6s. 6d. ?

55. A labourer earns £69 1s. 3d. in 100 weeks; what is that per week?

56. Twenty one vessels left Liverpool for America with goods, valued at £17847 13s. 2¼d.; what was the average value of each cargo?

57. The clothing of 144 charity children cost £257 11s.; what was the expense of each?

58. A prize of £420 10s. 6d. is to be equally divided among 108 persons; what is each man's share?

Case 3.—When the Divisor exceeds 12, and cannot be produced by the multiplication of two numbers, proceed thus.

```
      £   s.  d.  £  s.  d.
  13)14   9   6¼(1   2   3¼
     13
     ——
      1
     20
  13)29(2
     26
     ——
      3
     12
  13)42(8
     39
     ——
      3
      4
  13)13(¼
     13
     ══
```

	£	s.	d.			£	s.	d.	
59.	14449	19	7¾	÷ 17	69.	33123	9	10	÷ 76
60.	19549	19	6¼	÷ 23	70.	62141	2	11¾	÷ 83
61.	24649	19	4¾	÷ 29	71.	51739	17	0¼	÷ 91
62.	31449	19	2¾	÷ 37	72.	85312	16	3¼	÷ 97
63.	36549	19	1¼	÷ 43	73.	98436	18	3½	÷ 101
64.	39949	19	0¼	÷ 47	74.	69547	19	10½	÷ 107
65.	44199	18	11	÷ 52	75.	80451	5	11¼	÷ 111
66.	49299	18	9½	÷ 58	76.	57914	18	10¼	÷ 119
67.	56949	18	7¼	÷ 67	77.	105525	0	7½	÷ 123
68.	60349	18	6¼	÷ 71	78.	131839	12	4¼	÷ 139

79. A tradesman clears £35 9s. 4d. in 19 days: what is the average per day?

80. Thirty nine painters received £19 3d. for doing a quantity of work; what was each man's share?

81. The expenses of my house cost £176 13s. 10d. annually; what is that weekly?

82. What must I lay up per week, to save £551 5s. in 105 weeks?

83. I paid my journeyman £3 8½d. for wages during the month of August; what did he earn per day?

84. If 1 cwt. of sugar cost £2 9s.; what will 1 lb. cost?

	£	s.	d.			£	s.	d.	
85..	3057	5	1¼	÷ 365	93..	11464	17	6	÷ 237
86..	4095	17	8¾	÷ 489	94..	..	..	..	÷ 474
87..	5645	9	0½	÷ 674	95..	..	..	..	÷ 711
88..	7940	9	9	÷ 948	96..	..	..	..	÷ 948
89..	10687	16	7	÷ 1276	97..	..	..	..	÷ 1185
90..	12471	18	6¼	÷ 1489	98..	..	..	..	÷ 1422
91..	15621	6	4¼	÷ 1865	99..	..	..	..	÷ 1896
92..	20713	19	0¼	÷ 2473	100.	..	..	..	÷ 2133

101. A man's wages amount to £41 8s. 10½d. a year; what is that per day?

102. A tax-gatherer collected £1811 13s. 10¼d. in a year; how much was that daily on an average?

Ans. £4 19s. 3¼d.

103. A farmer pays yearly £24093 6s. 6d. for 9876 acres of land; how much is that per acre?

104. In a savings' bank 6473 depositors deposited £225840 5s 5½d. in one day; how much had each on an average deposited?

105. An army consisting of 24857 persons had £8337 9s. 0½d. equally distributed among them; what had each soldier to receive?

106. If the annual cost of a town with 2468 inhabitants is £29088 19s. 7d.; what is that per day for one person?

Case 4.—When the Divisor contains a fraction.

Rule.—Multiply both the divisor and the dividend by the under figure of the fraction, adding the upper figure to the product of the divisor; and divide by short or long division as the case may require.

	£	s.	d.		
107..	187	6	2	÷	6½
108..	237	14	9	÷	8¼
109..	367	8	3	÷	12¾
110..	475	9	6	÷	16½
111..	525	18	1	÷	18¼
112..	1087	16	7	÷	37¾
113..	1426	8	6	÷	49½
114..	1563	6	1	÷	54¼
115..	1981	2	11	÷	68¾
116..	2146	16	10	÷	74½

	£	s.	d.		
117..	2274	6	2¼	÷	58½
118..	5352	0	8	÷	76¾
119..	5026	12	5¼	÷	59¼
120..	5307	19	9¾	÷	83½
121..	4162	12	5¼	÷	69¾
122..	7014	4	3	÷	94⅘
123..	9337	13	6	÷	$108\frac{6}{7}$
124..	11512	15	8¾	÷	$121\frac{8}{9}$
125..	10622	3	4	÷	135⅚
126..	14214	17	0	÷	143⅞

OF WEIGHTS AND MEASURES.

	lb.	oz.	dwt.	gr.		
127..	509	11	7	18	÷	6
128..	679	11	3	16	÷	8
129..	764	11	1	15	÷	9
130..	934	10	17	13	÷	11
131..	594	11	5	17	÷	7
132..	339	11	11	20	÷	4

	lb.	oz	dr	sc.	gr.		
133..	249	6	7	2	15	÷	5
134..	598	11	7	2	8	÷	12
135..	449	2	7	2	11	÷	9
136..	349	4	7	2	13	÷	7
137..	399	3	7	2	12	÷	8
138..	499	1	7	2	10	÷	10

	cwt.	qr.	lb.	oz.	dr.		
139..	295	3	27	15	8	÷	4
140..	517	3	27	15	2	÷	7
141..	665	3	27	14	14	÷	9
142..	813	3	27	14	10	÷	11
143..	739	3	27	14	12	÷	10
144..	443	3	27	15	4	÷	6

	yd.	qr.	n.		
145..	6999	0	0	÷	8
1.6..	2624	2	2	÷	3
147..	4374	1	2	÷	5
148..	7873	3	2	÷	9
1 19	10498	2	0	÷	12
150..	6124	0	2	÷	7

	m.	yd.	ft.	in.		
151..	245	1759	2	9	÷	3
152..	573	1759	2	5	÷	7
153..	737	1759	2	3	÷	9
154..	901	1759	2	1	÷	11
155..	409	1759	2	7	÷	5
156..	327	1759	2	8	÷	4

	qr.	b.	p.	gal.		
157..	329	7	1	0	÷	6
158..	549	6	3	0	÷	10
159..	659	6	2	0	÷	12
160..	439	7	0	0	÷	8
161..	219	7	2	0	÷	4
162..	494	6	3	1	÷	9

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	yr.	m.	w.	dy.		
163..	779	12	2	2	÷	12
164..	194	12	3	4	÷	3
165..	649	12	2	4	÷	10
166..	259	12	3	3	÷	4
167..	584	12	2	5	÷	9
168..	454	12	3	0	÷	7

	a.	r.	p.		
169..	4239	3	20	÷	5
170..	9327	2	36	÷	11
171..	5087	3	16	÷	6
172..	6783	3	8	÷	8
173.	10175	2	32	÷	12
174..	7631	3	4	÷	9

175. If 1000 sovereigns weigh 21 lb. 4 oz. 15 dwt. 10 gr.; how much does 1 sovereign weigh?

176. If 210 gallons of distilled water weigh 2552 lb. 1 oz.; what is the weight of 1 gal?

177. If 4 cwt. 3 qr. 24 lb. 2 oz. of bread be equally distributed among 32 poor persons; what weight must each receive?

178. A clothier sold 8225 yd. 2 qr. 1 n. as follow; to 39 gentlemen he sold 1087 yd. 2 n. superfine black cloth; to 47 tailors 1718 yd. 1 qr. 3 n. drab cloth; to 58 drapers 3182 yd. 3 qr. olive cloth; and to 76 families 2237 yd 1 qr. mixture cloth; how much did each gentleman, each tailor, each draper, and each family purchase on an average of the said cloth?

179. A pedestrian walked 8027 m. 170 yd. in a-year; what was his average journey per day?

180. A wine merchant imported 35709 gal. 2 qt. 1 pt. in 259 casks; how much did each cask contain?

181 In 12 lunations there are 354 dy. 8 h. 48 m. 33 s.; what is the time between two consecutive conjunctions of the moon, or a lunar month?

Case 5.—When the divisor contains several denominations. *Rule.*—Reduce both the Divisor and the Dividend to the same denomination, and divide as in Simple Division; the quotient is an abstract number.

183. Divide £490 8s 1½d. by £81 14s. 8¼d. Ans. 6.
184. Divide £899 18s. 3¾d. by £99 19s. 9¾d. Ans. 9.
185. Divide 237yds. 2qr. 1n. by 33yds. 3qr. 3n. Ans. 7
186. Divide 333cwt. 2qr. 18lb. by 66cwt. 2qr. 26lb.—5
188. Divide 401a. 1r. 6p. by 44a. 2r. 14p. Ans. 9.
189. Divide 942gal. 2qt. by 76 gal. 3qt. 1pt. Ans. 12.
190. Divide 104qr. 7b. 1p. by 34qr. 7b 3p. Ans. 3.
191. Divide 87d. 13h. 24m. by 21d. 21h. 21m. Ans. 4

192. The annual endowment of a public charity is £551 5s.; how many persons will it relieve, when each person receives 5 guineas? Ans. 105.

193. How long must a labourer work, who earns 2s. 1¼d. a-day, and whose domestic expenditure is 1s. 3½d. a-day, in order to pay his landlord for arrears of rent £14 16s. 6¼d.? Ans. 365 days.

PRACTICAL EXERCISES.

1. Required the population of England, its counties; according to the Census of 1841 numbering as follow; Bedford 107936; Berks 161147; Bucks 155983; Cambridge 164459; Chester 395660; Cornwall 341279; Cumberland 178038; Derby 272217; Devon 533460; Dorset 175043; Durham 324284; Essex 344979; Gloucester 431383; Hereford 113878; Hertford 157207; Huntingdon 58549; Kent 548337; Lancaster 1667054; Leicester 215867; Lincoln 362602; Middlesex 1576636; Monmouth 134355; Norfolk 412664; Northampton 199228; Northumberland 250278; Nottingham 249910; Oxford 161643; Rutland 21302; Salop 239048; Somerset 435982; Southampton 355004; Stafford 510504; Suffolk 315073; Surry 582678; Sussex 299753; Warwick 401715; Westmoreland 56454; Wilts 258733; Worcester 233336; York 1591480;
Ans. 14995138 Inhabitants.

2. In a large school there are 210 persons, 6 are masters; how many scholars are there to one teacher?
Ans. 34.

3. Divide 20 shillings amongst John, James, and Joseph, so that John may receive 2s. 6d. more than James, and Joseph 2s. 6d. less than James.
Ans. John 9s. 2d, James 6s. 8d., Joseph 4s. 2d.

4. Divide £93 18s. 3¼d. amongst 4 tailors, 9 coblers, and 14 tinkers; give each cobler three times as much as a tinker, and each tailor four times as much as a cobler.
Ans. A tinker's share £1 1s. 1¼d.; a cobler's share £3 3s. 3¾d.; a tailor's share £12 13s. 3d

5. The quotient is 270008, the dividend 130619664417; what is the Divisor, the remainder being 54321?
Ans. 483762.

6. What numberis that, which multiplied by 408070 will make the product 247731135600? Ans. 607080.

7. A tradesman cleared £1149 19 9¼d. equally in 11½ years; how much was that a-year?
Ans. £99 19s. 11¾d.

48. A young gentleman, making his addresses in an old lady's family, who had five fine daughters, was told by her, their father had made a whimsical will, the first four of their fortunes amounted to £25000, the four last £33000, the three last with the first £30000, the three first with the last £28000, and the two last and two first £32000; now Sir, if you can unravel the will, you shall have my third daughter, Martha, I am sure she will make you a good wife. Ans. £37000 sum of their fortunes, £12000 youngest, £4000 eldest, £7000 second, £9000 fourth, £5000 Martha's fortune.

49. Bought 4876 a. 3 r. 32 p. of land, and gave one-eighth part of it to my son; how much had I left?
Ans. 4267 a. 1 r. 13 p.

50. What difference is there between twice six and thirty, and twice thirty six; also between twice nine and ninety, and twice ninety nine? Ans. 30 and 90.

51. A tradesman owed to A £476 14s. 8d., but has paid him £184 17s. 6d.; to B £500, but has paid him £376 4s. 9½d.; to C. £800, but has paid him £657 3s. 7¾d.; to D £763 13s, 4½d., but has paid him £479 15s. 8¼d.; how much does he owe to each, and what is the amount of his debts? Ans. to A £291 17s. 2d., to B £123 15s. 2½d., to C £142 16s. 4¼d., to D £283 17s. 8¼d.; in all £842 6s. 5d.

52. In 1646, the annual income of the Customs at Dundee was £500, at Leith £2334, at Aberdeen £572, at Glasgow £553; in 1844, at Dundee £42736, at Leith £631925, at Aberdeen £76258, at Glasgow £551840; how manifold have these Scotch ports increased on an average in value? Ans. $329\frac{248}{3959}$

53. By selling 600 herrings at 5 for 2d.; 300 of which cost me 2 a penny, and the other half 3 a penny, I evidently lose 10d.; pray, my ingenious youth, how happens that?

54. Subtract three score seventeen thousand, three score seventeen hundred, three score & seventeen, out of three score seventeen millions, three score seventeen thousand, three score seventeen hundred, three score and seventeen, as often as it can be found, and say

what the remainder exceeds or falls short of three score seventeen hundred, three score and seventeen.
Ans. 14707 excess.

55. What number multiplied by 20, will produce what 365, multiplied by 52 will do. Ans. 949.

56. Take 250 crowns, and pence just 42;
In part of £1600; how much is there now due?
Ans. £1537 6s. 6d.

57. From six score and ten pounds borrow'd, take three score paid:
'Twas a damsel that lent it; what's due to the maid?
Ans. £70.

58. My ingenious friends be so kind
The breadth of a certain field to find;
Rectangular is the form of ground,
Its area twice ninety yards was found;
Th' length was fifteen yards exactly true,
So tell me the breadth, and that will do.
Ans. 12 yards.

59. A country-girl to town did go with some eggs there to sell,
A gentleman she chanc'd to meet, and thus it her befell;
My pretty maid, said he to her, what number have you here?
I can't tell, Sir, said she to him, but this I'll make appear—
The first I met was raving Ned, a graceless boy is he,
He took from me one half I had, but return'd me just three;
Next I met was silly Bob, fully bent on jokes and tricks,
He got one-third of th' rest, but smilingly return'd me six;
Last of all I met with thievish Dick, whose age is elev'n,
He stole one-half of the remainder, but return'd me sev'n;
Now, my dear Sir, you have, with patience, heard my case deplore,
I sol'mnly declare eggs I have just two above a score;
In figures, Sir, you are skill'd, for knowledge you greatly thirst,
Tell me how many eggs I had in my basket at first.
Ans. 66.

60. One morning in May I went to survey,
When the sunbeams shone in the sky,
I measur'd round a four corner'd ground
Just fourscore yards th' length of each side;
The angle at B together with D,
A hundred and eighty degrees;
The meadow's content is all that I want,
Assist me kind youth, if you please,
Ans. 6400 yards.

61. Old Sam, who had in credit liv'd,
Tho' now reduc'd, a sum receiv'd;
This lucky sum 's no sooner found,

Than clam'rous duns came swarming round;
To th' landlord, grocer, many more,
Sam paid in all, pounds seventy four,
Four times that sum a friend he lent,
On Kate and 'self fifty he spent;
And when of all these sums bereft,
Fifteen times as much he had left.
Now show your skill thou learned youth,
The sum of Sam's fortune produce. Ans. £6720

62. Eighty thousand brave soldiers in battle there were
Plac'd on a vast plain; and in form a long square;
Now on how many square yards of ground did they stand,
At two yards and no more between man and man;
Four hundred rank, two hundred file, the answer explore,
Which is three hund'red sev'nteen thousand, six hundred and four.

BILLS OF PARCELS.

A TAILOR'S BILL.

*50, Market Place, Hull, Jan. 1, 1846.
Mr. John Young,
Bought of James Lord,

	£	s.	d.		£	s.	d.
4 Dress Coats, ... at	2	4	3	each,	‡		
6 Pairs Trousers, .. at	0	19	9	per pair,			
8 Waistcoats, ... at	0	9	10	each,			
2 Great Coats, ... at	3	5	7	each,			
3 Chesterfield Coats, at	1	16	9	each,			
2 Taglionis, ... at	0	9	8	each,			
					£31	14	11

	£	s.	d.		£	s.	d.
4 Pairs Boys' Shoes, at	0	4	8½	per pair			
2 .. Men's do. at	0	10	3	..			
3 .. Women's do. at	0	7	9	..			
5 .. Welgtn. Boots at	1	3	6	..			
4 .. Ladies' do. at	0	7	9	..			
5 .. Men's Slippers	0	2	8½	..			
					£11	4	7½

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* The heading of the rest is left out to exercise the pupil.
‡ See Exercises in Reduction of Money.

	£	s.	d.		£	s.	d.
14 Yards Muslin, ..at	0	2	9	per yard,			
15 .. Satin, ...at	0	7	6	..			
28 .. Calico, ..at	0	0	5½	..			
16 .. Velvet, ..at	1	2	9	..			
13 Pairs Stockings,..at	0	2	7	per pair,			
18 do. Gloves. ......at	0	1	11¼	..			
					£29	16	8

	£	s.	d.		£	s.	d.
1 cwt. Lump Sugar, at	0	0	8½	per lb.			
½ cwt. Hyson Tea,..at	0	6	9	..			
¼ cwt. Jam. Coffee, at	0	2	4	..			
1 cwt. Mottled Soap,at	0	0	5	..			
1 cwt. Currants, ..at	0	0	6	..			
½ cwt. Raisins, ...at	0	0	5½	..			
					£33	9	8

		d.		£.	s.	d.
A Fore-quarter Lamb, wght.	10½ lb. at	8	per lb.			
A Loin Pork, ..	21¾ lb. at	6	..			
A Saddle Mutton, ..	19½ lb. at	6½	..			
A Knuckle Veal, ..	17¼ lb. at	8	..			
A Rump Beef, ..	64¾ lb. at	6	..			
A Sirloin of Beef, ..	32½ lb. at	6½	..			
				£4	9	8

	s.	d.		£	s.	d.
12 Boxes Aloetic Pills, ...at	1	1½	each,			
14 Pectoral Plasters,.........at	1	3	...			
13 oz. Asthmatic Mixture,...at	0	9½	per oz.,			
15 oz. Sudorific do., ...at	0	11½	...			
21 Boxes Spermaceti Oinmt at	0	4½	each,			
16 Bettls. Arthritic Tincture at	1	2½	...			
				£4	2	6¼

	s.	d.		£	s.	d.
A Silver Tankard, wt. 18 oz., at	7	3	per oz.,			
A Silver Tea-pot, ... 56 oz., at	6	9	...			
A do. Punch-bowl, ... 19 oz., at	5	10	...			
24 Silver Dishes, each 14 oz., at	5	7½	...			
2 Silver Tureens, ... 31 oz., at	6	3½	...			
24 Silver Plates, ... 7 oz., at	5	9½	...			
				£183	17	4½

	£	s.	d.		£	s.	d.
6 Sarcenet Hoods, ... at	0	13	9	each,			
15 Fans, French Mounts, at	0	4	3	...			
28½ Yds. of Satin Ribbon, at	0	1	9	per yd.			
6 Laced Tippets, ... at	3	4	6	...			
4 Pairs Kid Gloves ...... at	0	4	9	per pr.			
19 Yards Rich Lace, ... at	0	9	6	per yd.			
					£39	2	7½

	£	s.	d.		£	s.	d.
13 Reams Demy Paper,... at	1	8	6	per rm.			
9 ... Hot Pressed,... at	0	19	4	...			
11 Vols. Dr. Tillotson's wks., at	0	18	6	per vol.			
6 ... Dr. Paley's do., at	0	9	10	...			
15 ... Dr. Sharp's do., at	0	7	4	...			
4 ... Dr. Milner's do., at	0	14	7	...			
					£48	15	4

	s.	d.		£	s.	d.
18 doz. Port .... at	4	9	per bottle.			
24 ... Sherry, ... at	3	6	...			
13 ... Champagne,....... at	4	4	...			
9 ... Tent, ... at	6	3	...			
15 gallons Brandy,......... at	7	9	per quart,			
21 do. Rum,............. at	1	10	...			
				£200	4	0

			d.		£	s.
12 Ches. Cheeses,	wt. 60 lb. each,	at	8	per lb.		
16 Stilton do.,	... 46 lb. ...	at	11	...		
11 Warkshre. do.,	... 21 lb. ...	at	6½	...		
9 Glo'ster do.,	... 15 lb. ...	at	5½	...		
14 Flitches Bacon	... 70 lb. ...	at	4¼	...		
10 Hams.	... 34 lb. ...	at	6¾	...		
					£94	0

			s.	d.		£.	s.
64	Quarters White Wheat,	at	5	9	per bushel		
46	... Red do.	at	5	3	...		
14	... Oats, ...	at	2	9	...		
17	... Barley,..........	at	3	6	...		
12	... Rye,..	at	3	9	...		
9	... Peas, ...	at	4	5	...		
						£293	18

REDUCTION

Is the method of reducing numbers of one denomination into other numbers of another denomination without altering their value.

To bring a greater name into a less. Multiply the given number by as many of the less, as make one of the greater; adding to the product each lower denomination as you proceed.

```
£  s.
3  4
20
64s.
```

To bring a less name into a greater. Divide the given number by as many of the less, as make one of the greater.

```
2,0)6|4s.
£3    4s
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EXERCISES.

How many farthings in

£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.
‡8	17	0	0	18	10	1	18	6	3	19	4	0	7	0	0	13
5	18	6	1	0	6	5	12	6	18	18	0	0	10	7½	0	17
3	18	8	1	3	3	0	12	10	3	5	4	0	10	6¾	0	10
6	11	2	5	17	6	18	4	0	2	6	8	0	11	6	0	14
6	10	3	1	11	0	1	13	7	2	16	0	1	12	4½	0	7
0	19	4	0	13	6½	1	15	3	1	6	8	0	17	7¼	0	19

How many halfpence in

£.	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£.	s.	d.	£	s.
6	10	6	4	2	6	18	10	6	51	6	0	24	0	0	124	4
18	18	0	3	3	9	8	14	0	50	8	0	33	14	8	96	12
5	10	10	2	9	10½	10	3	6	33	16	0	6	5	1½	15	8
94	10	0	19	7	0	2	19	0	33	15	0	3	1	10½	23	16
9	15	0½	0	19	0	5	10	0	23	5	0	17	7	1	18	0
48	13	0	9	0	6	2	18	4	7	14	0	9	11	3	15	18

Reduce the following farthings to d. s. and £.

‡8496
5688
3776
6296
5292
928

904
934
1116
5640
1488
650

1848
5400
616
17472
1612
1692

3808
18144
3136
2240
2688
1232

336
510
507
552
1554
845

648
840
494
675
378
928

Reduce the following half-pence to d. s. and £.

3132
9072
2660
45360
4681
23352

1980
1530
1197
9288
456
4332

8892
4176
4884
1416
2640
1400

24624
24192
16224
16200
11160
3696

11520
16192
3003
1485
8330
4590

59616
46368
7392
11424
8640
7632

73. Reduce * £4876 14s. 8½.; £5942 18s. 9½d.; £6543 19s. 11½d.; £9876 15s. 10½d. respectively to half-pence: £3241 17s. 9¼d.; £6284 16s. 7¼d.; £8343 11s. 5¼d.; £7469 13s. 9¾d. respectively to farthings.

74. Reduce * 2340833; 2852611; 3141119; 4740861 halfpence; 3112213; 6033437; 8009831; 7170903 farthings to sovereigns.

75. In 144 guineas, how many fourpences?
76. How many guineas in 9072 fourpences?
77. In 78 crowns, how many half-pence?
78. How many crowns in 9360 half-pence?
79. In £56 17s. 6d., how many half-crowns?
90. How many pounds in 455 half-crowns?
81. In £22 2s. 2d., how many twopences?

82. How many pounds in 2653 twopences?
83. In 487 crowns, how many fivepences?
84. How many crowns in 5844 fivepences?
85. In 489 guineas, how many ninepences?
86. How many guineas in 13692 ninepences?
87. In £576 7s. 3d., how many threepences?
88. How many pounds in 46109 threepences?
89. In £896 14s. 6¾d., how many three-farthings?
90. How many pounds in 286953 three-farthings?
91. In 748 guineas, how many sixpences?
92. How many guineas in 31416 sixpences?
93. In 2736 quarter-guineas, how many 7s. pieces?
94. How many 5s. 3d. in 2052 7s. pieces?
95. In 1000 crowns, how many groats?
96. How many crowns in 15000 groats?

97. In 96 guineas, as many sovereigns, shillings, sixpences, groats, and pence; how many farthings?

98. How many guineas, sovereigns, shillings, sixpences, groats, and pence, in 197760 farthings, and of each an equal number?

99. A gentleman had ten purses, in each purse there were 10 guineas, 10 sovereigns, 10 half-sovereigns, 10 crowns, 10 half-crowns, 10 shillings, 10 sixpences, 10 groats, and 10 pence; how many pounds sterling did they contain?

100. In £302 1s. 8d., how many purses, each containing £30 4s. 2d.?

TROY WEIGHT.

	lb.	oz.	dwt.	gr.			grains.	
101. Reduce*	50	6	10	12	to grs.	111. Reduce*	291132	to lb.
102. Reduce	12	7	12	13	.. ..	112. Reduce	72783	.....
103. Reduce	75	9	15	18	.....	113. Reduce	436598	.....
104. Reduce	113	8	13	15	.....	114. Reduce	655047	.....
105. Reduce	25	3	5	6	.. ..	115. Reduce	145566	......
106. Reduce	18	8	16	20	.....	116. Reduce	107924	.....
107. Reduce	4	8	4	5	.....	117. Reduce	26981	......
108. Reduce	23	5	1	1	.....	118. Reduce	134905	.....
109. Reduce	70	8	3	3	.. ..	119. Reduce	404715	......
110. Reduce	281	0	12	12	.....	120. Reduce	1618860	......